CHEMICAL LIBRARY
DEC 11 1923

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXIV. No. 3159.] LONDON, NOVEMBER 28, 1923. [75TH YEAR. PRICE 1s.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C.2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 LONDON WALL.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
SULPHATE OF AMMONIA PLANT
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
W. NEILL & SON, LD.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'NEILL, ST. HELENS.' Telephone No. 20.

Berk will guarantee
Sulphuric Acid
made from Spent Oxide, for
Sulphate Making
Telephone Ave. 4032. Ask Berk *Telegrams.* Berk, London.
F. W. BERK & CO. LTD
1 FENCHURCH AVENUE, LONDON E.C.3
WORKS AT STRATFORD, E. & MORRISTON, GLAM.

"TORBAY PAINT"
FOR ALL PURPOSES.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C.
51, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

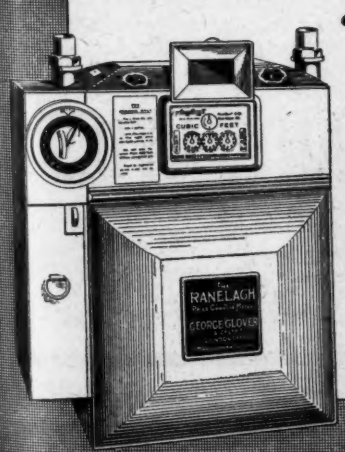
Telephones: 8966 VICTORIA. 8967 Do.
Telegrams: "GASIFICATION, Sowest, LONDON."
WALTER MOORE & SONS,
GAS COAL & COKE CONTRACTORS,
72, VICTORIA STREET,
LONDON, S.W. 1.

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on p. iii. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

George Glover's New
"Ranelagh"
Price-changer Pre-payment Gas Meter
can be supplied in the new
STANDARD SIZES



DRY METER REPAIRS.
A highly-skilled staff is maintained for the repair of Meters of all types and sizes. This Department has recently been extended and reorganised, and a Motor Service is available at Chelsea Works—also at Leeds, Manchester, and Cardiff branches—for the collection and delivery of Meters.

GEORGE GLOVER & CO., LTD.,
Dry Meter Manufacturers and Repairers.
RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.3.
Branches: Ranelagh Meter Works, East Park View, LEEDS; 74, Diamond Street, CARDIFF; City Meter Works, Fort Street, MANCHESTER.

Costs by using **FERNOUR ELASTIC PAINT** twice as long as other Paints.
BERMONDSEY, LONDON, S.E. 16.

SOME of the largest roof spans have been constructed by the Horseley Company—for example, Paddington Station Roof (1000 tons), Folkestone Station (4000 tons), Beckton Gas-Works (4000 tons); whilst our connection with the gas industry dates back to the earliest days when we constructed many of the first gasholders erected in this country. Our progress has pursued an eventful course in the engineering industry as the use of iron and steel increased, and to-day we are able to offer customers the benefit of our unrivalled experience in constructional work of all kinds.

HORSELEY
BRIDGE & ENGINEERING Co LTD
TIPTON · STAFFS · ENG·
The firm with a hundred years experience to rely upon.~~~

This large roof span (weight 4000 tons) over the Purifier House of the Beckton Gas-Works constructed and erected by the Horseley Company.

DONKIN
for
GAS EXHAUSTING PLANTS

VALVES, REGULATORS AND GOVERNORS, COMPRESSORS.

THE BRYAN DONKIN COMPANY, LTD.,
Head Offices & Works, CHESTERFIELD.
LONDON OFFICE: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.
Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.
Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin Company, Sowest, London."

GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Holborn 6857. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXIV., No. 3159.] WEDNESDAY, NOVEMBER 28, 1923. [75TH YEAR.

EDITORIAL NOTES.

The General Election and Industries.

DURING the next few days, we shall be experiencing in full intensity the whirl and turmoil of a General Election which has a greater importance and significance for the industries and industrial workers of the country than any other within memory. There has already been a tremendous torrent of words and argument from the three political parties; and the volume will be enlarged. Then will come a sudden cessation, and the verdict of the people will be awaited with some anxiety. The basic cause of this election is unemployment; the proposed remedy is protection of our industries by the establishment of tariffs on imported manufactured goods, but not on foodstuffs. A technical and trade paper, the "JOURNAL" knows no political party; but its duty compasses the consideration of matters which affect the country industrially. The gas industry is deeply concerned in the prosperity of the people and of the country's industries. Upon that largely depends its own prosperity and trading progress. When there is great unemployment, the spending power of the people is much less than would otherwise be the case; when there is stagnation over a large part of industry, there is a reduced demand for the primary and secondary products of the gas industry. Hence a good reason for considering with impartiality the present position.

When one reflects upon current conditions—as we all must be doing to-day with the view of determining which way our individual voting power shall be exercised, no matter whether we have adhered hitherto to the principles of Free Trade or are favourable to partially applied tariffs as is now proposed—the one salient fact cannot be avoided, that the present conditions of the country and the vast amount of unemployment have come upon us during the time that this country alone of all the important countries in the world offers free inlets for the manufactures of other countries. Nevertheless, there can be no gainsaying, we have been prosperous; but conditions have now undergone a transformation of a very violent order, with the results which we see before us to-day. This being so, something in the nature of a radical change may be necessary to meet such conditions. The institution of tariffs on manufactured goods may—not immediately, but gradually—assist in ameliorating present trouble, by enabling our works to do more and give to our people greater employment, by producing at any rate some of the goods manufactured and subscribing to employment in other countries, and imported in increasing load into this. If our individual decision is that no cure of that from which we are suffering can be found in existing circumstances, then it may be that those circumstances being of such a revolutionary character—having, for instance, altered all international currency relationships—may require of us a change in our political outlook, and a sacrifice of the formulæ and principles by which we have hitherto stood.

Those formulæ and principles may have been perfectly sound (say) forty or less years ago. But the conditions then and now are no more alike than the four-wheeled cab of the past and the motor car of to-day. Our trade abroad greatly increased during the quarter of a century prior to the war, and that under Free Trade; but there is the statistical fact that the trade of Germany and the United States —particularly in iron and steel and machinery, and in the former country in chemicals and dyestuffs—increased at a faster proportionate rate than in our own country; and both those countries had tariffs behind them in respect of importations. Some people tell us that while the proposal to apply tariffs to the importation of manufactured goods is now being made, the iron and steel trade is as busy again as ever. This cannot be accepted as a fact, and even if true it could not be conceded that there is any permanence in it. It is a well-known fact that there is still a good number of coke-ovens that were in commission before the war but have not yet been restored to operation. There may have been a burst of activity in the iron and steel industries through the plans for State-aided employment work; but the iron and steel industries at home cannot be working at maximum capacity if the production of metallurgical coke is not proceeding at pre-war rate, and, moreover, if a very considerable proportion of the metallurgical coke that is being produced is being exported. There are idle and unprovable things said from the political platform for the purpose of vote-catching. Up to the end of October this year, 2,228,033 tons of metallurgical coke were exported from this country; in the same period of 1922, 1,251,657 tons; in the corresponding period of 1921, 158,829 tons. Do those figures suggest that our home iron and steel industries have been as busy as pre-war, or that the iron and steel industries of other countries have been buying from this country metallurgical coke in heavier quantities than usual? For what purpose? The questions have to be considered in the light of the fact that the total number of coke-ovens in operation is not so great as before the war. The truth of things is often disguised by the suppression of facts; and the fluency of the tongue may lend considerable aid in the deception.

If Free Trade in manufactured goods under existing international conditions means that we are helping to provide employment in foreign countries while our own people are being afflicted by the dire effects of unemployment, then now is the time when principles must be sacrificed to that which appears to be practical in helping to bring about a reversal of the present state of things. Conditions cannot be worse than they are at present through any (let us say, still-to-be-proved) remedial change which may be applied. People talk of protection in the political sense. We talk of it in the humane and industrial sense. Our workers require protecting in the abnormal conditions of the time; our industries need greater security and greater confidence. These things, it is clear, can only be obtained by a change of front. As a nation, we must have the means for negotiating with other countries for the curtailing of their tariffs. That is the only way, it is the only road, to an ultimate, universal Free Trade. Given that, given equality, we should all be happy so far as this particular political polemic is concerned. We of the gas industry are not directly affected so far as plant and gas-heated appliances are concerned; in the lighting field we are, and the time may come when our home sulphate of ammonia market may be further invaded. Our interest as an industry is largely of an indirect nature, in that our gas business is confined to home, and our prosperity is much bound-up with the highest prosperity of this country, and particularly of those industries which require not only gas, but our other products. Thus it is we hope that whatever may be the issue of this General Election, it will produce or preserve that policy which will provide the best relief from our present difficulties, and promote the fullest measure of

prosperity for the country and its people. Whatever our political beliefs, they must not be allowed to block the way to the realization of those ends, always remembering the unprecedented entanglement of conditions which, working under present policies, we have proved ourselves as a nation incapable of unravelling.

One point more. A great deal is being said about a capital levy—the method of the Socialist extremists for reducing the War Debt. A more futile or damaging plan could not be conceived. A country in heavy debt does not require to have inflicted upon it the policy of financial impoverishment in order to liquidate its debts quickly. It requires the foundations of financial prosperity to be maintained, in order that the debt may be repaid, without injury to those foundations. These matters are not generally understood by industrial workers; therefore a suggestion that appeared in the Press a few days ago appealed to us as an excellent one. It was that employers should explain to their men the effect that a capital levy would have upon the business which gives them employment, as well as upon the credit of the country. Such a levy would reduce employers' capacity to employ; and the future state of the workers would be worse than the present. A capital levy is the road to increased unemployment. The workers should know this; and employers should personally take steps to give them the information.

Dr. Carpenter on Service and Wembley.

THE work undertaken and accomplished by the Gas Companies' Protection Association has not the restriction that might be inferred from the title of the organization. There is no prominent part of the work that was taken in hand last year that has not value for the whole of the gas industry; and in its prosecution, while the Committee were behind it all, the outstanding figure was that of the Chairman, Dr. Carpenter. This was particularly so in connection with the therm charges inquiry; and now, believing in its importance, he is throwing his whole weight and power of advocacy into supporting and assisting those who have in hand the development of the Gas Exhibit at Wembley next year. He is the representative of the Association on the Committee to whom have been entrusted the task of planning and carrying-out the exhibit; and we shall be divulging no secret when we say that the South Metropolitan Gas Company will be found in proximity to the Gas Light and Coke Company with a very substantial sum as their subscription to this very essential scheme.

We will not pass in review (the report elsewhere does that admirably) all the work that engaged the attention of, and demanded action by, the Association during the past year. But the therm inquiry and Wembley have a very close relationship; and although Dr. Carpenter did not definitely link-up the one with the other, the fact that there is connection stands out clearly by the juxtaposition of his remarks on the great event that has passed, and the great event that is to come—next year. If one thing more than another was demonstrated by the incidents that lead up to the therm inquiry, as well as by some of the evidence given before the Committee, it is the still existing mass of ignorance in the public mind as to gas and its accomplishments. There is even now, after all that has been done, a greater proficiency in the misuse of gas than in its efficient use; and this is a condition the gas industry has to counteract by very assiduous work. We have the means for being exemplary in economy and efficiency; but of those means not the best and most effective use is made. The repeated agitations against the gas industry could never be sustained if people had better cognizance of what gas can do, and put their knowledge into practice. Agitators cannot make any great progress against individual experience, if that experience is satisfactory; and competition finds the same thing. There we have the great problem that is before the gas industry to-day. Its lighting business would have been much larger than it now is if there had been greater satisfaction on the part of the more affluent part of the public with the lighting service which they were receiving and which was available, had they only known (and, known, had practised) how to make the most efficient use of it. This is a matter in which Dr. Carpenter has been a redoubtable protagonist. The last thing to which people would set themselves to try to convert him is the belief that the lighting load cannot be retained by gas. Such a belief would be contrary to his experience; and the reason for this is to be found in the last nine words of this passage from his address at the meeting of the Association: "I "believe, as a matter of fact, that one can sell anything, "if one only lays himself out to sell it." There we have the whole secret by which retention is to be obtained, if we give a broad interpretation to the words. The selling cannot continue without preservation; and preservation is one of the things that has to be legislated for in the trading methods of the industry. It is patent that this was well in Dr. Carpenter's mind while he was speaking, for almost immediately after the quoted sentence, we happen upon these words: "Imagine for a moment what an enormously "favourable position a gas undertaking is in. In most "cases the undertaking has a supply in practically every "house; and in the ordinary course of business a call is "made every quarter, or perhaps every six weeks. Think "what a valuable asset this is in the hands of a person "who has anything to sell. What would Selfridge's, for "instance, give for such an opportunity?" They would give much; while many gas undertakings ignore the opportunities which the privilege of entry to their customers' houses presents. This will not continue. Since Dr. Carpenter submitted to the Institution of Gas Engineers his paper on the lighting load, the subject has received greater prominence in the discussions of the gas industry, and free maintenance work is now moving into stronger relief in the trading policy of the industry.

Service is one method of solving the problen of how to educate the consumers, confound agitators, protect interests, and make it more difficult for competitors to take from us that which we have. It is also, as Dr. Carpenter points out, a means whereby business can be developed. But there are other means. There is public demonstration of the striking kind, which gives people something to talk about. The day is past for demonstrating in public the commonplace. Demonstration should be the vehicle for implanting new ideas and knowledge of improvements, and for developing the growth of those parts of our trading which present the largest of uncultivated fields. Dr. Carpenter is out for all this; and so in his address he urged the claims of the Gas Exhibit at Wembley next year. In last week's "JOURNAL," we supplied a general outline of the plans in embryo for the exhibit. Those general lines have the unqualified approval of Dr. Carpenter. In his opinion, the Gas Exhibit Committee have been very wise in their conceptions of what is required. They want to make the most of this opportunity for propaganda that will have the greatest educative and business-developing results among the public who will be attracted to Wembley from everywhere; and those who will be attracted to Wembley will be those who want to see and to know where the country stands in industrial progress. Those are the people whom the gas industry wants to meet there, and to show what it can do in efficiently ministering to domestic and industrial needs. In making appeal to the whole industry from the chair of the Gas Companies' Protection Association for the support of the Gas Exhibit, Dr. Carpenter asks the responsible administrators of gas undertakings and of manufacturing firms to be under no misapprehension as to what has to be done to ensure success. It is going to be a costly, but a necessary, piece of enterprise. But by the distribution of the expense over the whole gas industry, it will not be a matter of enormous gravity. Dr. Carpenter mentions £70,000 or £80,000 as the estimate; but when the Gas Exhibit Committee send out their appeal, they are hoping that there will be an enthusiastic response from all quarters of the industry. General co-operation can lighten the burden of cost, and can make a most effective display. The electricity industry has large opportunities for spectacular display; and at Wembley it is going to make the most of them. It is also going to make a brave show with domestic and industrial appliances, with which it is finding so much difficulty to make substantial headway. Behind the scenes at the restaurant centres of Messrs. Lyons and Co. at Wembley, gas-cooking apparatus on a large scale is being adopted. Experience teaches.

Gas in many ways has incomparable virtues. We have to make them known—here, there, and everywhere. Then, together, for the industry's display at Wembley, dip deeply! The money will surely be well spent. When Dr. Carpenter says what he did last Thursday, when the Governor of the Gas Light and Coke Company (Mr. D. Milne Watson) advises his Board to do what they have consented to do,

when the chief administrators of leading provincial gas undertakings have signified their intention to counsel their Boards to do their good part, and when the manufacturing firms are contemplating contributions to the pool for a co-operative display of the industry's modern methods of doing things—then all may be assured that this imposing lead in agreement would not exist, were there not satisfaction that the Gas Exhibit at Wembley is something that must be of the very best in merit and attractiveness. There is a mission for it to perform, and one which affects the dignity, interests, and prestige of the industry.

The Art of Steam-Raising by Waste Heat.

THERE are engineers who are of opinion that a great deal too much attention is being devoted to the utilization of the waste heat of retort-settings before there has been thorough investigation as to whether it is possible to obtain a greater efficiency in the settings themselves. That is a controversial issue which can only be settled by very searching exploration and experiment, and theoretically a very good case can be presented for such being made. But that is a matter which does not concern us in this article. The question we are invited immediately to consider is found in the paper which Mr. J. S. Thorman, the Engineer of the Stratford Works of the Gas Light and Coke Company, submitted yesterday at the meeting of the Southern Association of Gas Engineers and Managers. We are sorry (as we are sure the members were) that a recent operation prevented Mr. Thorman being present to read a paper which constitutes a challenge to many engineers who practise steam-raising from the waste gases issuing from their retort-settings. The calculated figures which the author has put into his paper, and the proof of them which he advances from a test made on the waste-heat steam-raising plant that he has installed, and which incorporates the improvements he deemed necessary, will bear only one interpretation; and it is that steam-raising from the waste gases of settings has not always hitherto been conducted in an efficient manner, with the result that the maximum savings have not been effected by the process. This is a matter which will arrest the attention not only of those who are at the present time using waste-heat boilers, but of prospective users, whose numbers will no doubt increase as the financial benefits and technical efficiency to be derived are made known by such papers as the one under notice. It deals mainly with the waste heat from an installation of ten settings of Glover-West vertical-retorts, carbonizing 240 tons a day, and incidentally gives information as to the temperatures for a typical horizontal regenerator setting.

There is a peculiarity about the Glover-West settings; and it is that, through the secondary air being heated by the extraction of heat from the coke at the base of the retorts, the waste gases from the setting are of considerably higher temperature than those from a regenerator setting. Owing to this, the system offers unusual opportunities for waste-heat recovery. There can be no question in this case (leaving out of account water-gas plant, which is easily self-supporting) that there is sufficient waste heat passing to the atmosphere in spent gases from the plant to provide all the power required on a gas-works—electric, hydraulic, or steam; and what is true in this case, Mr. Thorman holds is true in the case of all ordinary carbonizing plants. The author is not content to generalize, but in the paper sets out in a table the power requirements for all purposes on a gas-works (expressed in pounds of steam per ton of coal carbonized), and against the data are set the calculated pounds of steam that can be raised—showing a definite margin over requirements with all kinds of carbonizing plants. This is an important consideration; and it has become more so since the virtues of small coke and breeze for steam-raising have become better known to outside manufacturers, and the demand for such fuel is growing. But as to the adequacy of steam availability from waste heat, a few figures will emphasize this. Taking the average combustion chamber temperature of a Glover-West setting as 1300° C., the temperature of the waste gases at the base of the shaft averages 900° C., with a CO_2 content of 16 p.ct. Such a quantity of heat is very valuable for steam-raising. Adopting the estimated figure of 1300 lbs. of steam raised per ton of coal carbonized (which it will be shown later was exceeded in the test), the average amount of steam used for steaming the charges in the verticals, at 15 p.ct., amounts to 336 lbs.; so that there is an excess of 964 lbs. of steam. To raise this excess steam by small coke and breeze would require 1·72 cwt.; so that (giving the setting credit for the steam) the net fuel consumption for carbonizing would be reduced from 15 p.ct. to 6·4 p.ct. This is a considerable saving. But there will be engineers who will not follow the author's reasoning on this point. They will argue that, whether waste-heat boilers are working in conjunction with the settings or not, the same amount of fuel would be used in the producers. Because waste-heat boilers are added to make use of the high waste-gas temperatures and generate steam, it is perhaps hardly fair to credit the producers with the amount of fuel which would have been required to raise this amount of steam in an outside boiler. The inference is that much less heat than is actually used is required to carry out the carbonization in the settings. One can hardly think that fuel has been deliberately burnt in the producers in order to raise steam.

Naturally, the excess of steam available depends upon the efficiency with which the waste heat is utilized; and this is where Mr. Thorman finds that the plans usually adopted do not give the maximum efficiency. It may be that, in some particulars, reasons can be advanced in defence of existing practice; but to be acceptable the reasons must be very good, and show advantages to counterbalance the loss of efficiency with which they are charged in the paper. It is clear the author is not enamoured of the practice of fitting a small waste-heat boiler in the immediate vicinity of each shaft from vertical settings. The efficiency, he asserts, is not great; and there are other specified drawbacks. This conclusion is the result of observation in inspecting various plants, in the course of which Mr. Thorman found that much better efficiencies were being obtained from large unit boilers. In connection with the latter, there is a reference to Babcock and Wilcox boilers working in conjunction with the Woodall-Duckham settings on natural draught. We believe that the only Babcock boilers in use with such settings are at the Windsor Street Gas-Works, Birmingham, where six are installed. All these have a fan interposed between the boiler outlets and the chimneys. The average steam raised with these boilers is 2 lbs. per lb. of producer fuel, and not 1½ lbs. as stated in the paper. As a matter of fact, the last boiler of this type which was installed raised 3 lbs. of steam per lb. of producer fuel, which figure compares with what is generally obtained in the ordinary fire-tube boilers installed by the Woodall-Duckham Company.

But even with the large unit boilers, so far as Mr. Thorman's investigations went, he found that the best possible was not achieved—the dominating idea seemingly being that, if sufficient steam for steaming the charges was produced, it was satisfactory. Nothing more was being attempted, with the result that waste gases were not reduced below 400° C.; whereas by means of induced draught the heat of the gases could have been reduced, with an efficient boiler of sufficient capacity, to below 200° C., recovering thereby at least 100 p.ct. more steam. Consideration of these points led Mr. Thorman to recommend the installation at Stratford of two large Kirke horizontal fire-tube boilers, with induced draught—one boiler to five chimneys. He gives the reasons for his choice, and the test results supply full justification, as also for what he has done in conserving the heat in spent gases by a studious application of means of insulation. The author's experiments and data on this point should be very useful to other gas engineers. Between the base of the shafts and the waste-heat boiler, the loss of heat was so serious that he decided to line the steel collecting mains with porous diatomaceous insulating bricks, which proved to be, from experiments with various materials, the most efficient non-conductor. For the installation Mr. Thorman estimated that the heat losses in the collecting main between the setting and the inlet of the boilers would be reduced from 25 p.ct. without insulating bricks to 6 p.ct. by using the extra ring. It is interesting to note that this reduction, like his other estimates, was found to be well under the mark in the test with the new insulation—the actual heat loss between the two points named being 4·9 p.ct. This is another material saving of heat.

This care in installation, and in trying to secure the maximum possible efficiency, finds expression in the results of the 24-hour evaporation test already referred to, during which 230 tons of coal were carbonized in the ten settings. Is it not rather difficult to obtain an absolutely correct fuel figure over such a short test period as twenty-four hours? The paper was written on a calculated steam production of

1300 lbs. per ton of coal; the test results were 1751 lbs. of steam (at 115 lbs. pressure) per ton of coal carbonized, 1678 lbs. of steam per hour per setting, and 5·27 lbs. of steam per pound of producer fuel. Notable, too, is the efficiency ascribed to the Kirke boilers using waste heat—viz., 90·3 p.ct., compared with 50 to 60 p.ct. as an average in ordinary boiler working.

Now for a little criticism. Reference is made in an early part of the paper to a 90 p.ct. efficiency. One has always understood that such efficiencies were not possible by the extraction of heat from the waste gases as they leave the setting. If a start is made, as is done at Stratford, at 689°, and the gases finish at 225°, 60 to 65 p.ct. efficiency is the maximum theoretically possible. One may, of course, get 90 p.ct. of the heat actually absorbed in the boilers—that is the difference between 689° and 225°; but this is not 90 p.ct. efficiency from the heat of the waste gases as they come from the setting.

Let us also turn to the data given for the 24-hour evaporation test. If the figures for fuel to producers and the amount of steam raised are correct, then the inlet temperature would have to be 944° C. instead of 689° C. as given in the paper. Alternatively, assuming the figure of 689° C. to be correct and the amount of steam raised also correct, then the fuel used in the producer, instead of being 3211 lbs. per hour, would have to be 4757 lbs. per hour, assuming the CO_2 content of the waste gases as stated to be correct. If the coke used in the producers is actually 4757 lbs. per hour, then the amount of steam raised per pound of fuel would be 3·6 lbs., and not 5·27 lbs. In other words, the maximum amount of steam that can be theoretically raised from and at 212° Fahr. is 3·88 lbs. per pound of fuel used in the producers under the conditions given in the paper. The power taken by the fan appears to be proof that either a larger amount of fuel was used or that the volume of waste gases was increased by dilution with air to a greater extent than the CO_2 figure of 13·5 would indicate. It is more probable that the fuel figure is incorrect.

These criticisms notwithstanding, in our opinion Mr. Thorman completely proves the case as to the importance of heat recovery from coal carbonization, and the value of a deeper study of how to secure the maximum efficiencies in the utilization of waste heat in steam-raising. We expect there will be some considerable criticism of certain of his other figures—for example, the 750° C. of waste heat leaving regenerator settings. In this respect we are afraid there are not many engineers who know precisely what is the real temperature of the waste gases leaving their settings. Unless the percentage of CO_2 is known (and it should be 17 p.ct. at 750° C.), the temperature reading has no meaning. Generally, there are many air leaks after the waste gases leave the setting; but this does not matter if the waste heat is not going to be recovered. But it will be frequently found that the CO_2 is reduced thereby to (say) 10 p.ct., which means that the volume of waste gases has been doubled by dilution with air. In such a case, the temperature observed should be doubled to obtain the true amount of the waste-heat units leaving the setting. This by the way. The paper is a good one; and we think it can be said that the points it contains have not previously been so positively or concisely presented. Although there may be certain corrections to make in the data, the paper should prove of value in connection with the promotion of gas-works economies—a subject more important to-day than ever.

General Election.

We shall be much obliged if Secretaries will kindly communicate to us as soon as possible the names of successful candidates who are identified with the direction or management of gas-supply undertakings or manufacturing firms, in order that our readers may be informed as to the strength of the representation of the gas industry in the House of Commons.

Grants for Unemployment Relief.

There is better news regarding this matter so far as public utility companies are concerned. It is now understood that the National Gas Council have received a letter announcing that the Government have agreed to modify the conditions upon which assistance will be given to such companies. A paragraph in the letter states that it has now been decided that approved works financed out of renewal or reserve accounts can be assisted on the basis of a grant of 50 p.ct. interest for a period of years as if a loan had been raised. The meaning of this is not exactly clear; and Sir Montague Barlow is not at present available for securing a precise definition. But there is no doubt that the Unemployment Grants Committee are anxious to assist statutory gas companies as far as possible; and so those companies who can help with work should communicate with them at No. 23, Buckingham Gate, S.W. 1, setting forth information as to the work and expenditure, the method by which it is proposed to finance the work, and making inquiry as to what financial assistance will be forthcoming.

Therm Standard Price Reductions.

In the editorial article on this subject in the "JOURNAL" last week, a strong point was made in connection with negotiations or inquiries for the revision of therm standard prices, of the necessity for urging the claim of gas companies to consideration for any improvements effected in working which lead to a reduction of the cost of manufacture, apart from factors such as cost of material over which directors have no control. Since the article was written, we have recalled to mind the emphasis that was laid upon this matter by Mr. J. M. Campbell, of Margate, in his Presidential Address to the Southern Association of Gas Engineers and Managers in the early part of last year. In that deliverance, he said: "It must always remain a matter for argument by the company concerned as to the causes contributing towards the improved circumstances. Should these be clearly attributable to betterment by reason of either new plant, improved working results, more careful administration or technical skill, or all of these, it would be manifestly unjust to withhold from the stockholders the benefits of dividends increased beyond those ruling in 1914; and any revision arising from a claim made on this account should be met with strenuous resistance." There it will be seen that Mr. Campbell anticipated by many months the inquiries into this matter, and the justice of due allowance being made for good management. It is also recalled that in a subsequent paragraph of the address he referred to the dividends of sliding-scale companies being governed by the average prices ruling during the year instead of the highest, as is generally the case at the present time. It is interesting to note that the Eastbourne Gas Company are applying for an Order which, *inter alia*, provides for dividends being distributed in such a way that stockholders will obtain their proper share of distributable profits, governed by the price of gas quarter by quarter.

The "Standard Requirement" Scheme at Batley.

It will be seen from a letter contributed by Mr. R. H. Duxbury to our "Correspondence" columns this week that Batley is able to endorse all the good sales-promotion results that Mr. M'Lusky claims to have been realized from the adoption of his "standard requirement" gas-tariff system at Halifax. The experience at Batley extends over nine months; and since the introduction of the system, the sales of heating, cooking, and washing appliances have been more than doubled. That alone is testimony of its popularity in that town as well as at Halifax; and Mr. Duxbury, in the circumstances, cannot but agree that "the scheme is a step in the right direction." Further details will be found in the letter on a later page.

Conferences at Wembley.

The conferences at the British Empire Exhibition will alone be the means of drawing large numbers of professional men to Wembley. Three conference halls are being erected, which will have accommodation respectively for 200, 600, and 1800 people. The world power conference, to which Sir Arthur Duckham called attention at the recent meeting of the Society of British Gas Industries, will be highly important to all power-supplying industries; and we are glad that, through Sir Arthur's intervention, here will be representation of gas there. It is seen, by the way that the conference is being organized by the British and Allied Manufacturers' Association; it should have been a matter for all industries providing power agents. There will be the conferences promoted by the Gas Exhibit Committee. Most of the principal engineering and chemical organizations will be concerned in other conferences—the British Engineers' Association being particularly prominent. The Electrical Contractors'

Association are organizing one; and arrangements have been made between the British Science Guild and the National Joint Council of the Trade Union Congress and the Labour Party to hold a conference on Science and Labour on July 31 and Aug. 1 and 2.

Coal Exports.

The shipments of coal abroad took another flight last month. The total was 7,432,868 tons, compared with 6,196,411 tons in October, 1922, and 3,405,972 tons in October, 1921. The values were: Last month, £9,109,867; October, 1922, £6,992,631; and October, 1921, £4,851,452. The quantity of gas coal exported in October was 845,792 tons; the value being £1,017,646, or an average of £1 4s. 0·75d. per ton. The gas coal shipped abroad in October, 1922, was 810,998 tons (value £889,992); and in October, 1921, 472,082 tons (value £708,125). In the ten months of this year, the quantity of coal of all kinds sent abroad has been 66,905,810 tons, compared with 51,672,984 tons in 1922, and 16,757,526 tons in 1921. Of these quantities gas coal represented, respectively, 7,795,952 tons, 7,536,030 tons, and 2,611,065 tons.

Gas Coke Exports.

A very good market is still found abroad for gas coke. In October, 147,320 tons were exported, of a value of £250,280, or an average of £1 13s. 11d. per ton. In October, 1922, 114,884 tons were exported (the value being £154,111); and in October, 1921, 56,852 tons (value £89,008). The total sales abroad this year to the end of October have been 981,715 tons (value £1,569,315); 1922, 700,642 tons (£994,986); 1921, 327,797 tons (£733,371).

Atmospheric Nitrogen.

There was recently in the "Manchester Guardian" an article on atmospheric nitrogen, the author being Mr. G. H. S. Tupholme. He charges Great Britain with having stood practically still in the matter of nitrogen fixation—the Billingham plant being the only evidence of any interest taken in it. We think the author goes a little too far in saying that during the war this country was alone in not contributing to the study of atmospheric nitrogen fixation. There was a good deal of study, if very little was done in putting the results of the study into practical operation. The Billingham plant had its origin in war time, and was one result of the investigation which was then made into the question. It is true that Britain is now practically the only Power which has not within her own territory large-scale means of producing from the air those nitrogen compounds which are so essential both in peace and war. Mr. Tupholme holds that it is no use regarding ourselves as safe with our dye industry intact, inasmuch as the supply of raw materials is just as important. While the German factories can draw upon enormous sources of nitrates, British dye factories cannot. At present our security depends largely upon the importation of Chilian nitrates. We did not do badly in the war, when once we got properly to work, in supplying explosives; and Mr. Tupholme certainly shows his readers the worst side of the picture.

Rating of Machinery.

There are no signs of immediate settlement of this question There have been several inquiries and proposals all striving for some solution of the vexed problem. Now we see that the Minister of Health and the Secretary for Scotland have appointed a Committee "to inquire into the present law and practice in regard to the rating of machinery and plant in England and Scotland respectively, to make recommendations as to the alterations which are desirable and practicable, having regard to the financial and other considerations involved, with a view to removing inequalities, and, if possible, assimilating the law and practice of the two countries; and to make definite proposals for giving effect to such recommendations." The Rt. Hon. Edward Shortt, K.C., is the Chairman of the Committee; and the Secretary is Mr. G. R. Hill, of the Ministry of Health, Whitehall, S.W. Communications may be addressed to him there.

An Insensate Strike.

On Monday this week the boiler makers in the shipbuilding industry restarted work, on the terms of a settlement agreed to at a conference in Edinburgh between their representatives and the employers. There is a large amount of work awaiting the men, after their twenty-nine weeks' rest, through dissenting from conditions accepted and ratified by several other trade unions. The dispute resulted in throwing out of employment many men who were desirous of working. While some 10,000 boilermakers were concerned in the dispute, their inactivity resulted in about 60,000 workers in the shipping industry being thrown out of employment. Work has been carried over to the Continent; other countries have benefited through this example of crass stupidity at home. It is computed that the dispute has cost, in loss of wages, "doles," relief payments, and demands on trade union funds, between £9,000,000 and £10,000,000, without calculating the value of the work put into other countries.

PERSONAL.

Following on the death of Mr. James Hutton, the Chairman and Managing-Director of Messrs. Alder and Mackay, Ltd., Mr. HAROLD E. BENNET and Mr. WILLIAM GRANT have been appointed Joint Managing Directors. Mr. Harold E. Bennet will remain in charge of the London Branch. Mr. J. L. BENNET has been appointed Technical Director to the Company. Mr. J. MILLER THOMSON, W.S., who has for many years been legal adviser to the Company, has accepted a seat on the Board, and will act as Chairman of Directors. Mr. JAMES O. SCOTT has been appointed Sales Manager.

Mr. R. W. EDWARDS, of Aldershot, is at present W.M. of the Palma Virtuti Lodge, No. 4183, which was consecrated about two years ago. Bro. Edwards was initiated in a Northern Lodge just thirty years ago.

Mr. FRANK R. AYRE is resigning his position in the Birmingham Corporation Gas Department as from the end of this month, in order to take up an important appointment with the Parkinson Gas Stove Company, Ltd., of Birmingham. Further details as to Mr. Ayre's career will be found in "THE GAS SALESMAN" to-day.

An interesting presentation was made at Hereford last week, when Mr. W. T. NEWTON, Assistant Engineer and Manager at the Gas-Works, was the recipient of a silver watch from the staff and employees of the Corporation Gas Department. In handing the watch to Mr. Newton, Mr. W. G. Bethell spoke of the esteem in which Mr. Newton had always been held by all the men, and wished him every success in his new work. Mr. Roberts (Engineer and Manager) and Mr. W. G. Charles (Chief Clerk) also extended their hearty congratulations and best wishes. Mr. Newton, after spending just over four years at the Hereford Gas-Works, leaves to take up a position with the Woodall-Duckham Vertical Retort Company, Ltd.

OBITUARY.

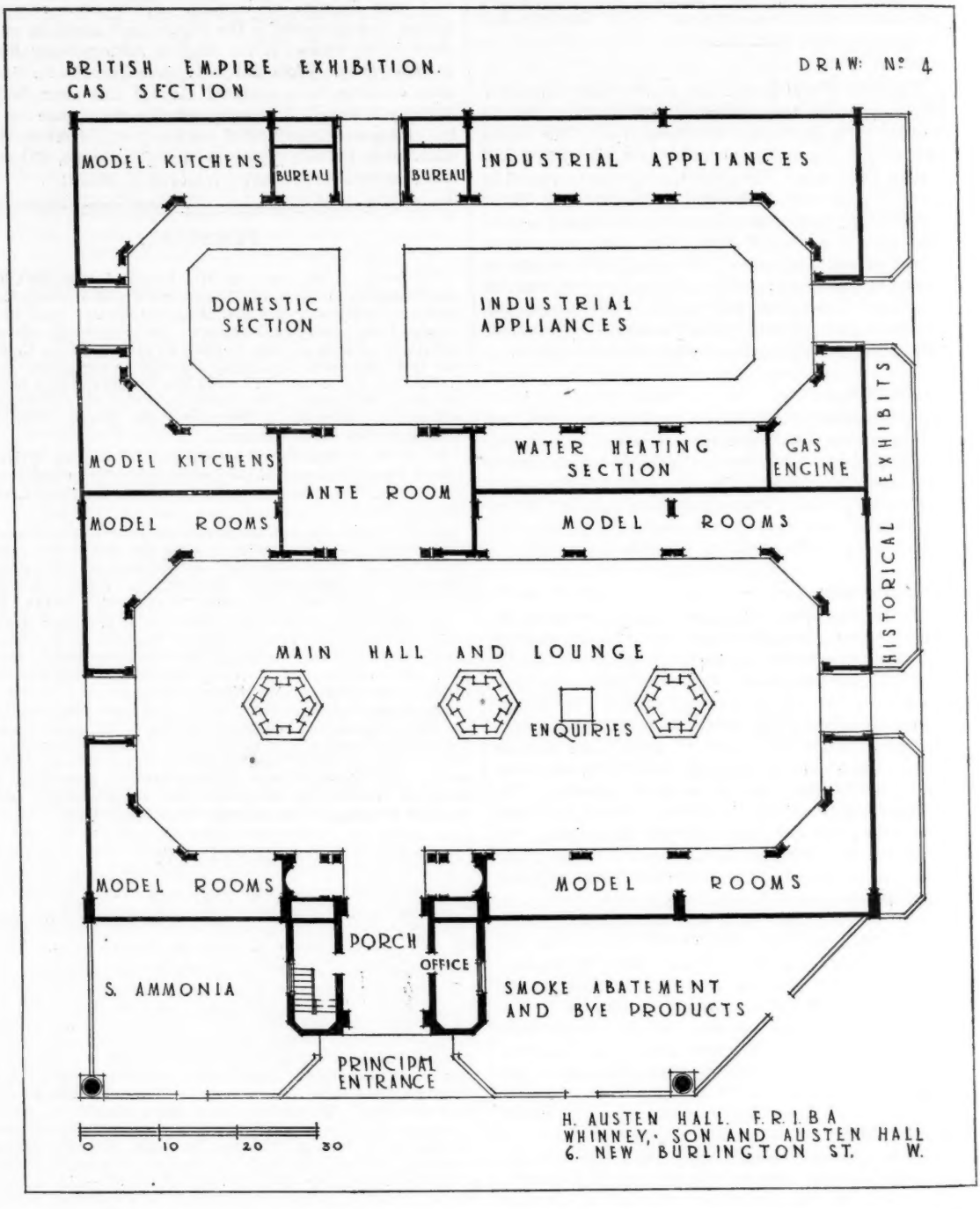
W. H. Y. WEBBER.

It is with sincere regret that we have to announce the death of Mr. WILLIAM HOSGOOD WEBBER, in his 71st year. The sad event took place at Pentewan, Cornwall, on the 21st inst.

Mr. Webber had had a varied career in connection with the gas industry. His early experiences were obtained in the drawing and constructional offices of various engineering works, and during those times he was particularly identified with the erection of gasholders. Even in those days he was a facile writer on subjects of then current interest to the gas industry; and he also made contribution to one or more sections of "King's Treatise on Coal Gas." Thereafter he became associated with the "JOURNAL," and for some time was its leading editorial writer. During his work as a colleague, he made himself particularly prominent in connection with his advocacy of what was then regarded as a low-grade gas—viz., gas of 14 c.p.—and in this relation he received several engagements in connection with Bill, in Parliament to give evidence as to his studies of the matters both in Germany and practically in this country. Those were the days when undertakings with 16 and 15 c.p. standards were desirous of getting to lower levels in that respect. His part in the controversy that took place in connection with columnless gasholders will also be remembered by many of our older engineering friends. He also made a very complete study of the regenerative system of retort-settings, when these were in their infancy. Between that time and the severance of his connection with the "JOURNAL," he contributed to the proceedings of the Institution of Gas Engineers, and on occasion participated in the discussions at the annual meetings.

Mr. Webber resigned his position on the "JOURNAL" early in 1904, and almost immediately afterwards became identified with the executive work associated with the Earl's Court Gas Exhibition. Since that time he has been occupied in official capacities in connection with the Gas Light and Coke Company—taking a particular and prominent part in the staff instructional work of that large undertaking. In this direction, he was a very keen worker, believing strongly in the effect upon efficiency of a sound understanding of the principles of the work upon which men are engaged. Mr. Webber was the author of various books well known to the students of gas manufacture and utilization.

THE GAS EXHIBIT AT WEMBLEY.



In the first editorial in the "JOURNAL" last week, we gave a general sketch of the proposals relating to the Gas Industry's Exhibit at Wembley next year, of which Exhibit Mr. D. Milne Watson is the Chairman, and Mr. F. W. Goodenough the Chairman of the Executive Committee. In our editorial columns this week, there is reference to the strong appeal for support which Dr. Carpenter made at the meeting of the Gas Companies' Protection Association. This is a matter for the entire industry; and the Committee are looking to receiving encouragement and support from every one of its units.

This week we publish a ground plan of the exhibit, which should be studied in conjunction with the information supplied in the article last week.

Also appended is a list of the members of the Gas Exhibit Committee:

GAS EXHIBIT COMMITTEE.

Mr. D. Milne Watson . . .	President, National Gas Council. (Chairman—Main Committee.)
Dr. Charles Carpenter, C.B.E.	President, Gas Companies' Protection Association.
Mr. H. Wade Deacon . . .	President, British Commercial Gas Association.
*Mr. S. Tagg	President, Institution of Gas Engineers.
*Mr. F. C. Tilley	Chairman, Society of British Gas Industries.
*Mr. F. W. Goodenough . .	Executive Chairman, British Commercial Gas Association. (Chairman, Organizing Committee.)
*Mr. A. A. Johnston	Brentford.
*Mr. J. W. M'Lusky	Glasgow.
*Mr. W. J. Sandeman . . .	Croydon.
*Mr. A. Stokes	London.
*Mr. S. E. Halliwell	Bristol.
Mr. J. W. Auchterlonie. . .	Cambridge.
Mr. C. Chambers	Harrow.
Mr. G. Clarry	Cardiff.
Mr. Ralph Halkett	Sheffield.
Glasgow Corporation Gas Department (Convener of) . .	Glasgow.
Alderman Sir W. Kay, J.P. .	Manchester.
Mr. J. Paterson	Cheltenham.
Mr. H. Pooley	Leicester.
Mr. W. E. Price	Hampton Court.
Mr. T. P. Ridley	Newcastle-upon-Tyne.

Mr. C. S. Shapley . . . . Leeds.
Bailie Stewart . . . . . Edinburgh.
Mr. E. Upton . . . . . Liverpool.
Alderman J. H. Waddington . Halifax.
Mr. R. Watson . . . . . Doncaster.
Mr. W. N. Westlake . . . . Exeter.

Society of British Gas Industries.

*Mr. J. W. Drake (Drakes Ltd.), Halifax.
Mr. T. Alborn Clapham (Clapham Bros., Ltd.), Keighley, Yorks.
*Alderman George Clark, J.P., (The Bryan Donkin Co., Ltd.), Chesterfield.
*Mr. F. J. Gould (Bland Light Syndicate, Ltd.), 29, Little Trinity Lane, E.C. 4.
Mr. C. A. Goodall (Goodall, Clayton, & Co., Ltd.), Hunslet, Leeds.
Mr. R. B. Hodgson (Ashmore, Benson, Pease, & Co., Ltd.), Stockton-on-Tees.
Lieut.-Col. W. R. Glover, C.M.G., D.S.O., Gothic Works, Upper Edmonton.
Mr. J. W. Wilson (Wilsons and Mathiesons, Ltd.), Armley, Leeds.
Mr. P. H. Sugg (Wm. Sugg & Co., Ltd.), Westminster, S.W. 1.
Mr. E. J. Davison (Davison and Partner, Ltd.), Westminster, S.W. 1.
Mr. John Orme (The National Gas Engine Co., Ltd.), Ashton-under-Lyne.
Mr. T. Allen (Gibbons [Dudley], Ltd.), Dudley.
Mr. B. B. Waller, Stroud, Glos.
Mr. Norman Wilton (The Chemical Engineering and Wilton's Patent Furnace Co., Ltd.), Westminster, S.W. 1.
Mr. Albert Cliff, J.P. (Williamson Cliff, Ltd.), Stamford.
Mr. Cyril G. Davis, 60, Oxford Street, W.
Mr. R. J. Milbourne, J.P., Donnington, Nr. Newport, Salop.
Mr. G. S. Bennett (Gibbons Bros., Ltd.), Dudley.
Mr. H. M. Thornton, J.P., (Richmond Gas Stove and Meter Company, Ltd.), 164-172, Queen Victoria Street, E.C.

* Members of Organizing Committee.

EVENING STAR CHAPTER.

List of Officers for 1924-25.

The following is a list of the officers elected on the 14th inst. in the Evening Star Chapter for the year 1924-25.

Ex. Comp.	F. C. Tilley, P. Z. 1348	. . . . .	M. E. Z.
" "	H. W. Packham	. . . . .	H.
"	S. Freeman Burrows	. . . . .	J.
"	R. P. Normand	. . . . .	Scribe E.
" "	W. A. Surridge, P. G., Std. B., P. Z. 1201, 1397, 1719	. . . . .	Treasurer.
" "	A. C. Beal, P. Z. 1719, 2913	. . . .	D. C.
" "	C. Hulme, P. Z. 382, P. Prov. G. Std. B. Mddx.	. . . . .	Scribe N.
"	Chas. Clare	. . . . .	P. S.
"	W. Burgin	. . . . .	1st A. S.
"	W. McDowall	. . . . .	2nd A. S.
"	W. W. Hammond	. . . . .	Steward.
"	J. Oswald	. . . . .	Steward.
"	E. G. Bartholomew	. . . . .	Steward.
" "	R. H. Goddard	. . . . .	Janitor.

Pacific Coast Gas Association.

Nearly 200 active members took part in the thirtieth annual convention of the Pacific Coast Gas Association, held at Del Monte, California, under the Presidency of Mr. F. S. Wade, of Los Angeles. After the President, in his address, had dwelt upon the problems confronting the gas industry, and reviewed the growth and development of the recent past, Mr. G. L. Myers, of Portland (Ore.), as Chairman of the Committee of Public Ownership of Securities, submitted a report in which was pointed out the social value to the companies of customer ownership as contributing to the practice of thrift, its economic significance in bringing down the cost of acquiring the necessary capital for additions and improvements, and its general utility in finding a ready market for their securities, and in stabilizing them. Meter shop cost accounting was dealt with by Mr. E. G. Campbell, of the Pacific Coast Gas and Electricity Company, who described the system in operation by his Company in San Francisco. This contribution resulted in the reflection that cost of meter maintenance has never been given proper attention; yet it is undoubtedly a factor in attempting to decide upon the type of meter most suitable for any particular situation. There was also a demonstration of keeping consumers' accounts by machine, which is said to be proving highly satisfactory in actual practice. By this method, the old-style register gives way to a simple consumer's card that carries accounts. With the aid of a book-keeping machine, the posting is directly done upon these cards—the machine calculating the difference in meter indices, as well as totalling all the accounts appearing on the card, and carrying forward the balance. On the technical side, reports were presented by Mr. W. S. Yard, as Chairman of the Committee on Gas Generator Design, and by Mr. K. C. Tomlinson, as Chairman of the Naphthalene Removal Committee. The first-named report dealt fully with the subject of wash-box design, and showed that small boxes are apparently the things to adopt, as they maintain agitation, and thus do away with the deposits in the washer which have hitherto required so much effort and expense to remove. Depth of seal was also considered, and the report recommended a deep seal for the gas dip pipe. A number of papers on live subjects was submitted to the meeting.

ELECTRICITY SUPPLY MEMORANDA.

THE evidences of unreliability of electricity supply continue to project themselves upon the public; and in various places, those who have confided their home, shop, or factory lighting and power to the fickle agent have somewhat severe regrets. Where electricity has been adopted for cooking (relatively to gas there are few cases), those concerned in persuading adoption have had some most uncomplimentary things said about them when a fuse has blown, or the service has been interrupted in any other way, and has hindered or spoilt a dinner. No hotel or restaurant could afford to entrust their cooking operations to an undependable agent of the kind. Our electrical friends tell their clients that electricity supply is more reliable now than formerly, and that the chances of collapse are very remote. But such electricians are constantly being rebuked by unpleasant incidents, and are made conscious by them that truth is not always a feature of their statements. The most unexpected things occur to deny assertions and to shatter the confidence of the public. On the afternoon of Thursday, Nov. 15, Brighton found itself deprived of electricity soon after three o'clock; and in some parts of the area the cessation of supply continued nearly forty minutes. The cause of the trouble was at the North Road station; and it was due to a curious circumstance. It seems that two men were working on a door near some high-tension terminals, when the door slipped, and, producing a short circuit, shut the whole works down. The men had a remarkable escape; but we fancy they must have had a nerve-racking experience. A London paper reports another breakdown at Brighton last Friday evening. The collapse this time lasting half-an-hour. Then York has been having demonstration of the jumpy proclivities and temporary retirement from service of electrical current. On the 15th inst., at the Durham Assizes in the city, there was a dimming of the lights, and then they went out, and so did Mr. Justice M'Cardie. It is a serious business for the electric light to interfere with the course of justice. His Lordship remarked while the light was flickering that this was the second time during the Assizes that it had interfered with the work of the legal luminaries. It is too bad; but it is worse when it interrupts work in the hospitals. But this was all a prelude to the city experiencing a total stoppage of the current on the following Saturday evening—due to the breaking-down of a main trunk feeder from the generating station to the centre of the city. The newspaper reports state that very great inconvenience was caused. This strikes one as rather a superfluous statement applied to a Saturday evening. Through a heavy fault developing on the main system, there was an outbreak of fire at the Fairclough Lane power station at Liverpool last Wednesday morning. The current failed, and for an hour or so tramcars were stranded, and where light and power were required from the cables, an opportunity for a little leisure was afforded. There was a failure at Kensington last Friday evening. The total collapse only continued about five minutes; but it was more than an hour and a half before there was normal service.

The Inconstant Current.

In an Industrial City.

Something approaching a catastrophe for those factories relying upon electrical energy for power has been experienced at Coventry. Through an electrical accident, there has been only a restricted supply for the factories; and as it was expected that some time would elapse before there was normal supply again, an alteration of working hours in the factories had to be agreed upon. That is a nice state of things for an industrial city. One report says that in this case initially the breakdown was due to one of the 6000-KW. turbo-alternators. In the course of operation, the machine was automatically removed from the busbars; and this in its turn caused one of the feeder-breakers to come out. The result was that a flash-over took place between the busbar contact of the switch isolating link and its earthed metal base. Unfortunately, this did not end the chapter of accidents, for the overload thrown on the other machines caused a distortion in the stator winding of one of the 3000-KW. alternators; and the complete burning-out of this machine then followed. There is generally a substantial record of misbehaviour on the part of electricity supply just before Christmas time.

The Light in the Windows.

Members of Chambers of Commerce are always interested in hearing some one talk on subjects in which they are concerned—particularly if economy or improvement in something relating to business is in view. Artificial lighting is an important matter for tradesmen; and there is less disposition to neglect it as a factor in business than was formerly the case, although one has not to walk far through our shop-flanked streets to see that the lighting traditions of the past still have good representation, and misapplication of light is much too profusely demonstrated. It has been shown lately that the electrical people are driving hard to get recognition among shopkeepers that they are the sole agents for suitable lighting. There is much testimony that this is not so; and gas people must not allow the idea to spread that electricity alone can be the universal pro-

vider. Electricity undertakings appear badly to want additional lighting. They require more business in the higher priced units; and they also desire to get shopkeepers to go in for long-hour lighting—window lighting after the shops are closed—in order to help to reduce the valley that then obtains in their output curve, just as they are trying to raise the lower parts of the valleys during the daytime by pushing electric cooking. The Hackney and Stoke Newington Chamber of Commerce have recently had a lecture by Mr. W. E. Bush, the illuminating expert of the British Thomson-Houston Company. He is strongly of opinion that economy of light in a shop window is a mistake; light, if properly used, is the best salesman a tradesman can have. Of course, such statements need qualification. Light for any purpose can be overdone, just as can be the reverse, as it all too frequently is. Of course, the cost of illumination per unit of light is much lower to-day than it was but a few years ago; and so there is no excuse for inadequacy or impropriety. But notions as to what is adequate and what is proper are generally very indefinite; and the untutored (in lighting matters) or misguided tradesman, often flies from illumination poverty to that which is garish and glaring. Mr. Bush very properly says that glare is the biggest difficulty with which electrical people have to deal; but we would suggest that a bigger trouble is that the electricity suppliers hesitate to cope with it—probably on account of the additional money expense to the users. Mr. Bush advised the employment of reflectors; but the reflectors he recommends apparently cost a good deal of money. This is clear from an illustration he gave. He spoke of a trader using four reflectors, costing £8; and, writing-off the cost at the rate of 10 p.ct. per annum, this would mean 16s. a year. He assumes electricity at 3d. per unit, which is an assumption that will not fit many actual circumstances. Taking the use of light at 500 hours, and the cost at 3d. per unit, this would mean £2 10s. for current. Manifestly he does not expect the shopkeeper to use much light, as £2 10s. spread over 500 hours only allows 1·2d. for current per hour, even at 3d. per unit. We are of opinion that the total estimate for 500 hours' lighting errs considerably on the economical side. To be added to the £2 10s. is the 16s. for the reflectors; and he asks whether it is not worth while paying this 16s. in order to get two-and-a-half times the amount of light. No more light is actually obtained from the lamp; it is only light reflected in the direction it should go. The "two-and-a-half times" show what a large part of the light of an electric lamp is uselessly given off without the necessary accessories. However, he finds that with the illuminating power of shop windows raised three times, 33 p.ct. more people stop to look in the window; when it is raised to six-and-a-half times, the drawing power is increased to 73 p.ct. It is really wonderful how accurately electrical men are able to measure these things. Of course, besides light there is in this another factor, and that is the people. If, unfortunately, they do not happen to be in the streets, they cannot be drawn by the light in the windows.

Electric Fires.

There is a changed tone in some of the electrical papers regarding electric heating. They were grumbling a little while ago as to the paucity this season of new designs for electric fires and as to the indolence of the electricity supply authorities in pressing for business for this short-time and peak-raising demand at low prices. Perhaps those who grumble have had an intimation that it is bad policy to write thus about a branch of the business. Competitors are observant; and the public get to know of indifference on the part of electricity suppliers. The manufacturers also complained that they were receiving no encouragement. The writer of "Trade Talk" in "Electrical Industries" has completely changed his note. He now hears of more than one large manufacturer who has been compelled almost to suspend deliveries, owing to the shortage of refractory bases. He regards this as a sign of prosperity in which the whole industry is sharing. Many responsible men in the electricity industry will raise their eyebrows over this, and will probably not deem it necessary to make any calculation as to their share in the "prosperity" due to this particular line of business. Not long since we were being told that certain of the electric fire manufacturers were not making any particular provision regarding stocks, in view of the sluggish demand they were receiving. This, too, may account for the shortage of refractory bases. But we should like to have fuller particulars regarding a statement which the same writer makes, because we do not believe it, or, if is true, it must be a very isolated instance. He says: "I heard of a case the other day of a consumer being offered three or four really high-grade gas-fires free—not even rental to pay. I understand this class of competition is growing. In previous years this free distribution of gas-fires seemed to stop at the architect; but its extension to the general public is proof that electrical heating is a serious competitor on cost, apart from health and convenience." We know of no such extension; capital cannot be squandered in that way. We challenge, too, the cost aspect of the question, as well as those of health and convenience. Self-deception seems to be a very prevalent complaint in the electricity industry.

One Coal Fire and a Coke-Heated Boiler.

There is nothing particularly novel about the one-coalfire house. The gas industry has long been an advocate of such dwellings; and we believe that under the post-war housing schemes many have been erected. The economy in structural costs through the adoption of gas-fires in bed and other rooms has been grasped by the electrical industry, which, if it suits its purpose, is not at all reticent in making use of the ideas of its well-established competitor. "Electrical Industries" draws attention to the one-coalfire houses that have been constructed at Brighton. They contain dining-room, drawing-room, kitchen, cloak-room, and the usual offices on the ground floor; and four bedrooms, bath-room, and usual offices on the first floor. Only the dining-room possesses a fire-place; electric fires being used in all the other rooms. The kitchen is fitted with an electric cooking range, with a "Glow-worm" coke-heated boiler for hot water supply. Though a coke-heated boiler has been adopted (it would not have been installed had electricity been able to offer something better), our contemporary cannot avoid having a little contemptuous gibe at it. It admits that it has advantages; but it has its disadvantages. It is dusty; it requires intelligent stoking with properly graded coke; and the heat losses from the whole system are excessive. This apparently is the worst that our contemporary can say; but there is the fact that the coke-heated boilers have received preference. They have only been adopted because they are regarded as the best water-heaters available, without introducing hated gas for the purpose. "Electrical Industries" thinks that immersion heaters in a hot-water tank give a more convenient arrangement; but it does not reduce the heat losses. People have their own ideas as to what constitutes a "more convenient arrangement." And on the point of convenience, it is much better to accept the verdict of the public than the biased view of an electrical exponent of wonderful virtues which practical investigation fails to reveal. The electrical writer would naturally much have preferred electric calorifiers over the bath and the sink. But apparently the architect and the builder could not raise their faith in them sufficiently to risk courting disaster. We have seen that there is a coalfire flue and a coke boiler flue in the house. These are utilized to warm four ventilating-flues, which lead from the upper part of the rooms. It is estimated that the reduction of chimney complications has enabled these houses to be erected at some £300 to £400 less than the cost of a similar house on ordinary lines. The basis of this estimate of saving must be chimneys of superb characteristics. However that may be, there will have to be strict discipline and closely observed rules in these houses in respect of heating; otherwise it may be predicted with some amount of assurance that the electric heating bills will not be of a modest order. This will be shown after six months' operation in winter. Perhaps some of the tenants will in time like a few radiators fitted up to the hot-water system from the coke-fired boiler.

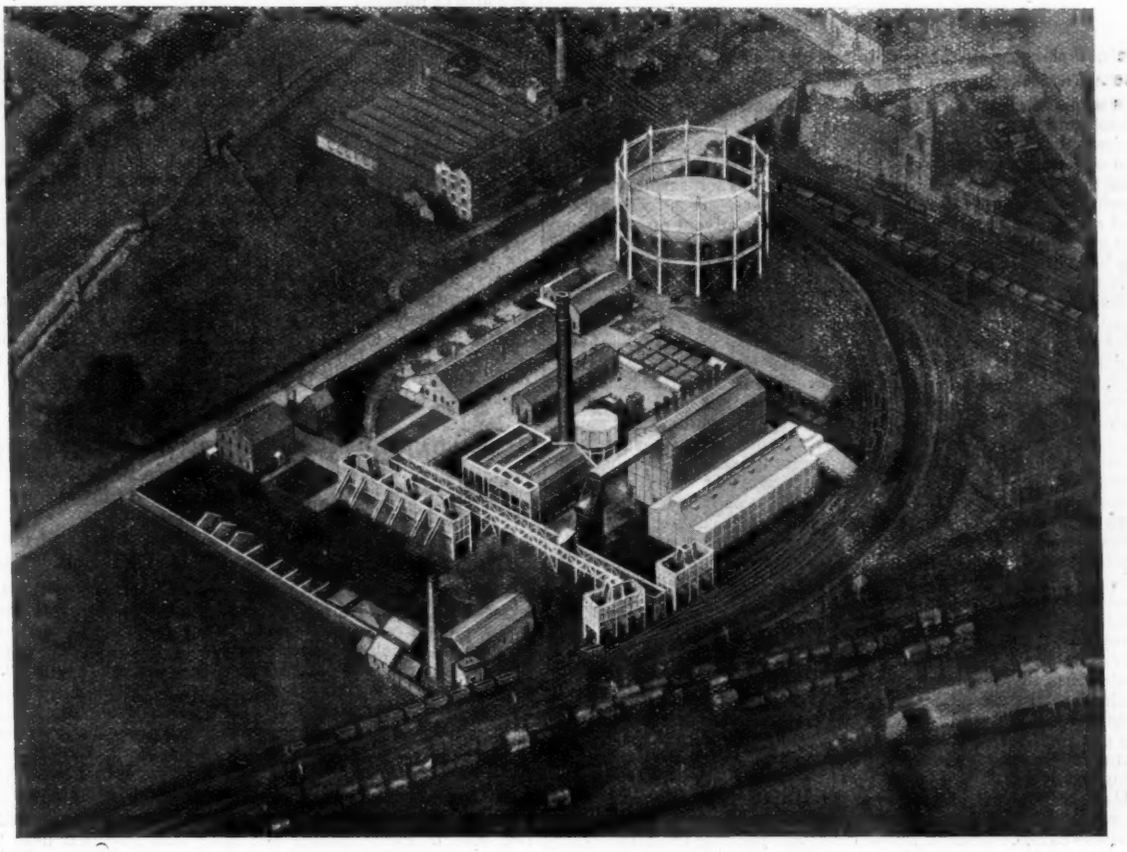
Teaching the Young Idea.

The "Electrician" has a brilliant idea. It has found out that there are numerous training institutions throughout the country where cookery is taught as part of the curriculum. It has also discovered that the housewife is conservative by nature, and, furthermore, that what she has been taught to use, she will use, and a great deal of persuasion will be needed to make her change. Just so. Not all housewives are easily beguiled; and before making changes, most of them want to know that the change has economy and other value in it. Another thing that has been brought to the knowledge of the "Electrician" is that most of the educational institutions are equipped with Victorian coal ranges or gas-cookers. This must be inquired into and improved upon. We cannot have these training establishments with Victorian gas-cookers in them, when the modern types are so much more efficient both in respect of heat and of operating range. However, our contemporary urges that it should be part of the electrical propaganda to see that these institutions are fitted with electric cookers and other apparatus, and that both teachers and pupils are made acquainted with their advantages. We know of one training institution in which there was an electric cooker, the "advantages" of which had been so well discovered that it stood rusting, while teaching was carried on with the range of trusty gas-cookers in the same room. The gas-cookers were very tolerant; and they did not in the least mind the derelict being there.

Water-Tube Condensers at Tipton.—We learn that the new set of water-tube condensers at the Tipton Urban District Council Gas-Works was supplied by Messrs. W. C. Holmes & Co., Ltd., of Huddersfield—and not by Messrs. R. & J. Dempster, as stated in the description of the extensions at the works which was reproduced in last week's "JOURNAL."

Hydrated Lime in Road Tar.—Mr. C. A. Longley writes to the "Chemical Trade Journal" to point out that, by the addition of hydrated lime to the tar, objections raised against the use of tar for roads are overcome. The writer has found that the addition of hydrated lime (of extreme fineness and entirely free of caustic lime) to tarred stone or slag (1) eliminates the danger of damage to fisheries, vegetation, &c., caused by washings from tarred roads, as it absorbs the greater percentage of acids and oily matter; (2) owing to its affinity for tar, tenacity and elasticity of the mass is produced, and therefore what is termed "cushioning" of the road is brought about. The use of hydrated lime in concrete also, he says, gives greater density and impermeability, besides a more easily worked mixture, which naturally considerably increases production; and yet it costs practically nothing.

VERTICAL RETORT WORKING RESULTS FROM CARLISLE.



A FINE AERIAL PHOTOGRAPH OF THE NEW ROME STREET GAS-WORKS, CARLISLE.

With the permission of Mr. J. E. Blundell, the Engineer and Manager of the Carlisle Corporation Gas-Works, we reproduce a remarkable aerial photograph recently taken of the new Rome Street Gas-Works.

The plant comprises an installation of Glover-West vertical retorts with very complete coal and coke handling apparatus, and is in every respect a fine example of a modern English gas-works. A full description of it was given in our issue for Oct. 11, 1922 [p. 100]. We are now able to publish the results realized during the last complete period of six months.

Working Results for Six Months.

(April 1 to Sept. 30, 1923.)

Coal carbonized (98 p.ct. Cumberland coals)	9,604 tons
Total gas made	182,999,000 c.ft.
Gas made per ton	19,050 c.ft.
Calorific value	450 B.Th.U.
Therms per ton	85·7 therms
Coke and breeze for sale	4,788 tons
do. per ton of coal	10 cwt.
Total sulphate of ammonia	290,920 lbs.
do. per ton	30·2 lbs.
Total tar	165,139 galls.
do. per ton	17·19 galls.

Stresses in Welded and Riveted Tanks.

An account is given by Messrs. A. H. Stang and T. W. Greene, in Technological Paper No. 243 of the United States Bureau of Standards, of stresses in a few welded and riveted tanks tested under hydrostatic pressure. According to an abstract appearing in the November issue of the "Journal of the Franklin Institute," for the purpose of ascertaining the relative merits of riveted, as compared with electric welded, tanks, four steel tanks, 4 ft. in diameter and 10 ft. long, made of $\frac{5}{16}$ in. mild-steel plates, were tested under hydrostatic pressure. The tanks were designed for a stress of 16,000 lbs. per sq. in., at a working pressure of 200 lbs. per sq. in. Two of the tanks were butt welded, one was lap welded, the fourth was of ordinary lap-riveted construction. The ends of the tanks were spherical, having a radius of 4 ft. Strain gauge measurements were taken at various parts of the tanks, and at pressure increments of 50 lbs. per sq. in. until failure. However, the results of the hydrostatic tests proved rather unsatisfactory as a comparison of the relative strengths of the different types of construction. In consequence of secondary failures—such as leaks round the fittings—the possible strength of the tanks was not reached. In fact, secondary failures were responsible in each case. The analysis of the deformation and distribution of stress in these tanks seems to them to warrant the conclusions that the commonly accepted theory for the design of tanks is, for all practical purposes, sufficiently accurate, provided the computed stresses are not influenced by secondary stresses; that for thin tanks the measured stresses, based upon the two-dimensional formula, are in close agreement with the design stresses computed by the common-pressure formulæ, provided the former are not affected by secondary causes; and that the stresses were increased by the presence of a seam.

Royal Sanitary Institute Congress.—The next congress of the Royal Sanitary Institute will, by invitation of the Lord Mayor and City Council, be held at Liverpool from July 14 to 19, 1924.

Association of Consulting Engineers.—The annual dinner was held at the St. Stephen's Club, Westminster, on the 21st inst., when the toast of "The Bench and the Bar" was responded to by the Hon. Mr. Justice Shearman, Mr. Alexander Macmorran, K.C., and Mr. H. P. Macmillan, K.C.

CO_2 for Cleaning Pipe Stoppages.—The General Carbonic Company, of New York, are putting on the market an anhydrous carbonic gas for use in removing service pipe or main stoppages. This gas is sold in cylinders containing 20 lbs., or 165 c.ft., of the liquified CO_2 gas. It is claimed that this gas can be used with greater satisfaction, and at less cost, wherever compressed air or the hand pump has been employed before. The flow of gas can be regulated and adjusted to any pressure desired, and the pipe stoppage immediately cleared with the use of a very small amount of CO_2 gas.

Volumetric Measurement of Coal.—James E. Lea, B.Sc., in the course of a lecture to the Electrical Power Engineers' Association, on "The Volumetric Measurement of Coal in Relation to Power Station Problems," demonstrated by experiments on many different sizes of coal the fact that a given volume of screened coal always weighs the same, within very small limits, whatever the size of the coal may be. A hopperful of large nuts will weigh substantially the same as a hopperful of small pea coal. This fact depends upon the average geometrical similarity of the small and large pieces, and makes it possible to ascertain the weight of coal burnt with practical accuracy by the measurement of its volume. In the Lea coal meter this principle has been taken advantage of.

PUBLIC WORKS, ROADS, AND TRANSPORT EXHIBITION.

Features of Interest to Gas Engineers.

On first entering this Exhibition, which is now being held at the Royal Agricultural Hall, Islington, the first impression was that a mistake had been made, and that instead of arriving at an exhibition relating to the art of road making, one had come to a motor show. All round were fascinating vehicles, well-designed, and of colours ranging from crimson to yellow ochre; and it was something of a shock to realize that, on further scrutiny, these machines were different types of road-rollers. It is to be hoped that ready purchasers are at hand, for their advent on the roads will certainly do much to brighten the thoroughfares, and enliven the lives of road-roller drivers.

It was but natural to find that only a section of the Exhibition was of direct interest to gas engineers; but this limited portion was well presented, and a few of the exhibits were brilliant—we refer to the stands of Messrs. Parkinson and W. & B. Cowan, Ltd., and The Horstmann Gear Company, Ltd. It is amusing to relate that, concerning the first-named, several interested persons inquired whether something had not been added to the gas, to make the illumination so good. To this question, of course, Messrs. Parkinson and Cowan had a ready answer—they had added engineering skill in the manufacture of their lamps and burners. An exhibit of considerable interest at this stand is a street lamp fitted in a "U" fixing. This is attracting much attention; and it was explained that the latest development is in a box attachment wherein a clockwork controller may be placed. Another new feature consists in the embodiment of a side air-adjuster; this fitting being applicable to all types of lamp. The whole stand is admirably set-out, and the effect of the lighting most convincing. Many people have to be informed that the gas is supplied at normal low pressure—not at high pressure. The Horstmann Gear Company are showing a complete range of gas-controllers, but make a special point of their type "3A/UNI" controller. In this the controller and gas-cock are two interchangeable units, and any controller can be instantly locked to any gas-cock of its own type. If necessary it can be unlocked and removed from the cock without disturbing the mantle; the latter being left alight, if desired. Type 3A/UNI has a 14-day run.

Messrs. Thomas and Bishop, Ltd., have many exhibits of interest, among which mention may be made of their "Flexo" asbestos furnace cement and "Permac" jointing material. On gas-works plant, great difficulty is often experienced in making tight joints, and keeping them in this condition; and the makers of "Permac" claim that its use offers an adequate solution to this difficulty. It is a metal-to-metal jointing material in powder form, and is unaffected by acids, alkalis, oil, steam, &c. Experience in gas-works has proved the worth of the material when exposed to hot creosote oil, ammonia, sulphuric acid, and many other fluids. "Flexo" is a highly refractory cement—as is proved by tests carried out by Dr. J. W. Mellor, who found that, under a load of 35 lbs. per sq. in., the material was good up to a temperature of 2372° Fahr., and on normal refractory test withstood Cone 14. The cement fuses into a glaze which unites with the surface it covers. Consequently it is a highly valuable material for mending cracked retorts and furnace settings.

The Staveley Coal and Iron Company, Ltd., are exhibiting cast-iron pipes and specials for gas, water, sewage, steam, and high-pressure hydraulic mains, and a full range of coke-oven and gas-works bye-products, such as sulphate and muriate of ammonia, the benzene hydrocarbons, oleum, aniline oil, cresylic acid—to mention but a few. The firm manufacture pipes from a diameter of 72 in. downwards; and these are products which amply demonstrate the care taken in their production. It is interesting to note that the blast furnaces at the Staveley works are of the most modern type.

Messrs. George Kent, Ltd, have this time concentrated on a display of their many well-known water meters. It has become customary to look to this firm for something new at every exhibition; and all engineers will find much interest in the "Edwards'" patent automatic stop valve—a device for preventing excessive flows of water through mains. We cannot enter into a description of this valve, but it may be said that it is designed on the Venturi principle, and the Venturi head—*i.e.*, the difference in pressure between the inlet and the point of maximum constriction—renders possible the accurate adjustments necessary to ensure closing at any desired rate of flow. The closing action takes place quickly during the first three-quarters of the travel, but is slowed-down in the final stages to prevent excessive concussion.

The exhibits of Messrs. Reavell and Co., Ltd., and of Messrs. Stothert and Pitt, Ltd., are both interesting. On the stand of the former Company a portable air-compressor capable of delivering 151 c.ft. per minute, at a pressure of 100 lbs. per sq. in., is shown. This, it may be noted, has been sold to The Gas Light and Coke Company. Messrs. Stothert and Pitt are showing an excellent concrete mixer, known as the "Victoria." This combines the features of mixing in a horizontal position, with the quick discharge obtained by tilting the drum while it continues to revolve. The design is equally suitable for work other than road construction—particularly where it is necessary to load the dry materials below ground-level. The loader guides are easily extended to any reasonable depth; and, in general, the mixer is built substantially, and is capable of giving lasting service. The stands of Messrs. Ruston and Hornsby, Ltd., and of The Rawlplug Company, Ltd., are also of interest.

It is impossible to conclude these few notes without referring to the pleasing design of the exhibit of the National Benzole Company, Ltd., which is a practical example of the industrial application of art. The scenic effect of the broad massing of yellow and black is at once simple and attractive; and the literature prepared by the firm is in keeping with the high quality of their products. It is difficult to assess the strength of this appeal in terms of money; but it is certainly by no means inconsiderable. The stand of the British Petroleum Company, Ltd., has also been planned with great care, and the literature of this firm is remarkably good. Perhaps liquid fuel lends itself to artistic treatment.

The Institution of Gas Engineers have arranged conferences for Nov. 28, when Mr. H. E. Bloor, B.Sc., B Eng. (Engineer, Secretary, and Manager of the York Gas Company), will read a paper on the "Quality and Composition of Town Gas," and Mr. Stephen Lacey, B.Sc., A M.Inst.C E. (Distributing Engineer, Gas Light and Coke Company), will present one on "The Position of Mains in Public Highways." This is most fitting, for the gas industry has played an important part in the progress of road-making.

MAGNETIC SEPARATION OF COKE FROM CLINKER.

The September number of the monthly Bulletin of the Swiss Gas Association described some interesting results obtained at the Berne Gas-Works with a recently installed plant for the separation of coke from clinker. Formerly, the producer and boiler clinker were hand-picked and mechanically screened—a process by which a certain amount of fuel was recovered, but only, of course, with regard to size, and not to quality. The results, on dry reckoning, were:

Size mm.	Over 30 (1·2 in.).	10 to 30 (0·4 to 1·2 in.).	Below 10 (0·4 in.).
Ash p.ct.	31·7	54·7	62·5
B.Th.U. per lb.	9475	6225	5175

For the labour cost, these were considered unsatisfactory.

Last winter an electro-magnetic separation plant to deal with two tons of crude clinker per hour was installed next to the retort-house. The system chosen was the Ullrich. The plant comprises a spout for the raw material, an iron belt, which conveys it to a bunker with a jigging screen attached, and the magnetic separator itself. The latter consists of a double screen with four outlets, a picking belt, and the separating drum with the electro-magnet built-in. A 15 H.P. motor drives the mechanism of the plant, and the dynamo (110 volts, 2·5 KW.) for the production of the direct current for the separating drum. A switchboard and five hoppers for the screened material and the slack complete the plant.

The clinker is tipped from trolleys straight into the spout, and the belt conveyor takes it to the bunker. From here it is separated by the jigging screen into small on one side (up to 10 mm.) and large (above 40 mm.) on the other; the latter being hand-picked by the one man who has charge of the entire plant. The medium sizes (10 to 40 mm.) are divided on the double screen to above and below 20 mm., and run through the four outlets direct on to the steel bands of the magnetic drum. The latter attracts the magnetic material—*i.e.*, the burnt-out slack—to its sides, where it is held until, through the rotation of the drum, it reaches the part beyond the magnetic field, while the non-magnetic coke does not adhere, but is precipitated forward. The coke and the ashes, thus separated, fall sorted into their proper hoppers, whence they are removed, as required, by truck. The unburnt coke of over 50 mm. is best hand-picked immediately on leaving the producers. In this way a more even service of the magnetic separator is possible.

Up to the present, tests on the coke recovered have given the following average results, reckoned on dry material:

Size mm.	20 to 40 (0·8 to 1·6 in.)	10 to 20 (0·4 in. to 0·8 in.).
Ash p.ct.	17·2	23·6
B.Th.U. per lb.	11,725	10,755

This is a considerable improvement in quality on the results of the old method. The large coke recovered is used up in the producers, and the smaller sizes either sold or used for boiler firing.

From Jan. 25 to Aug. 2 of this year, 1830 tons of raw material were treated in the new plant. From this were extracted—

Coke above 40 mm. (1·6 in.)	168 tons	= 9·2 p.ct.
,, from 20 to 40 mm.	417 ,,	= 22 8 ,,
,, ,, 10 to 20 ,,	392 ,,	= 21·4 ,,
Total	977 tons	= 53·4 p.ct.

The whole process required in all about 400 man-shifts, including the leading of the material to and from the plant. The total installation cost, including all building charges, was 37,750 frs. [about £1500], and it is estimated, therefore, that it will soon pay for itself.

WASTE HEAT AND ITS INSULATION FROM GLOVER-WEST VERTICALS AND OTHER CARBONIZING PLANT.

By J. S. THORMAN.

[A Paper read at yesterday's meeting of the Southern Association. Mr. S. B. Chandler's paper, "Some Aspects of Distribution," and our report of the whole proceedings, will be published next week.]

WASTE heat recovery from coal carbonization cannot be considered general practice in the gas industry to-day. The probable reason for this is that, in the past, steam has been raised for power purposes from breeze and small coke—fuel for which there has not been a ready market.

A rapidly increasing demand for such fuel has been created by the following factors:

1. The efficiency obtained in burning fine coke or breeze, mixed with coal slack, by the sandwich system under chain-grate boilers—a practice increasingly adopted by many industrial corporations.
2. The more general use of small-graded coke, taking the place of anthracite, in small central-heating boilers and anthracite stoves.
3. The realization of the necessity for the conservation of coal.
4. The desirability of using a smokeless fuel.

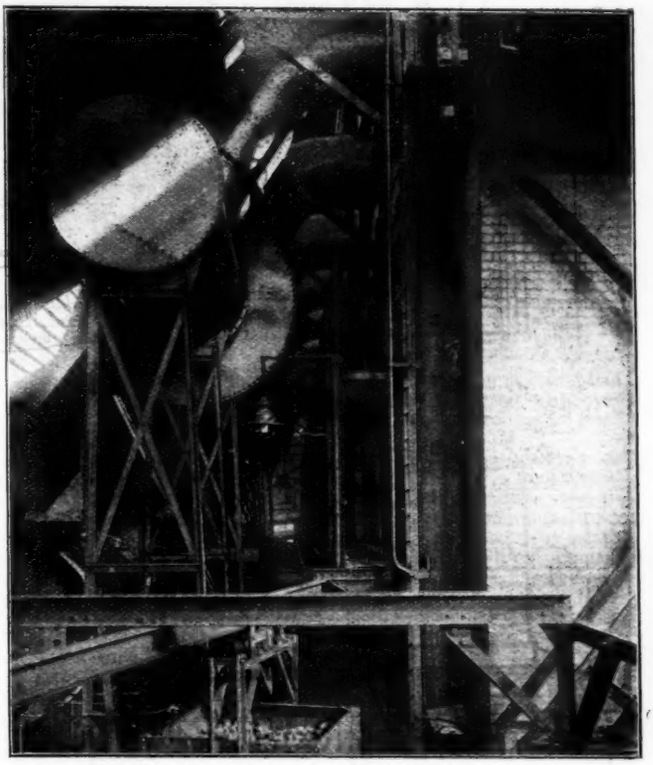
The question of generating steam from waste heat becomes, therefore, one of greater importance, the financial benefits of which, apart from thermal efficiency, are well worth the serious consideration of gas engineers. In these notes the author proposes to deal with waste heat from coal carbonization, apart from carburetted water-gas manufacture.

Several papers have been read on the question of recovery of waste heat from the manufacture of blue or carburetted water gas; and waste-heat boilers are to-day becoming part and parcel of water-gas plants. Where several water-gas sets are fitted with waste-heat boilers, sufficient steam can be raised to supply not only the generators and turbine blast fans, but also all incidental plant in connection with water-gas manufacture, so that water-gas plants can be said to be self-supporting as regards steam and power from waste heat, and should only require a balancing steam main from the works boilers, as a store for give and take. The greater part of the notes in this paper have special reference to waste heat from an installation of ten sets of Glover-West verticals carbonizing 240 tons per day—the principal carbonizing installation at the author's works.

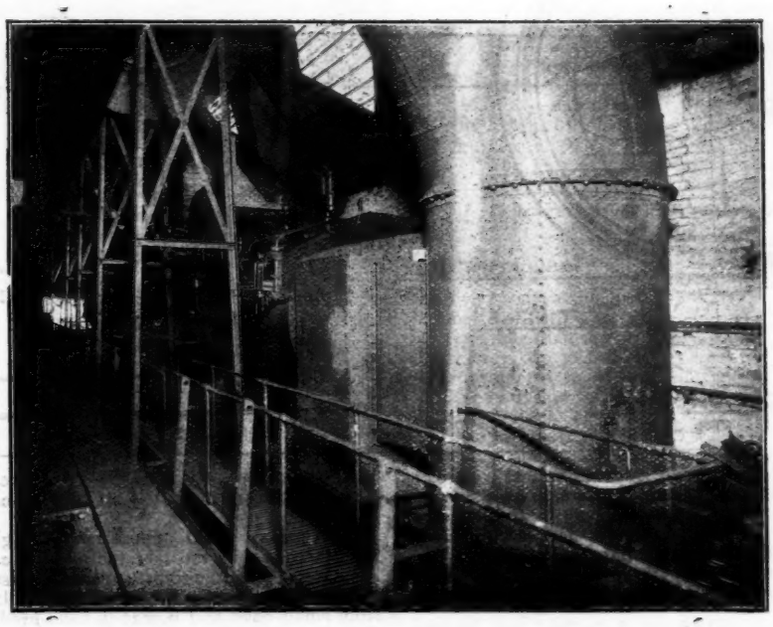
WASTE HEAT FROM GLOVER-WEST INSTALLATIONS.

The waste gases from Glover-West vertical settings are of considerably higher temperature than those from regenerator settings, owing to the fact that secondary air is not preheated by waste gases, but by circulation round the base of the retorts, thereby assisting in cooling the coke before extraction. For this reason a Glover-West vertical plant offers the greatest possibilities in waste heat recovery.

It was found that, with an average combustion chamber temperature of 1300° C., the temperature of the waste gas at the base of the shaft averaged 900° C., with a CO_2 content of 16 p.ct. Waste gases of such a temperature were obviously very valuable for steam raising. Taking the fuel consumption per generator per setting at 336 lbs. per hour (equal to 15 p.ct.), it was calculated that there was sufficient heat passing from each setting to produce over 1900 lbs. of steam per hour, if all could be absorbed. Assuming at the outlet of a boiler a reduction of the temperature to 200° C., and allowing for boiler efficiency and heat losses between the base of the shaft and the boiler, it was estimated that at least 1300 lbs. of steam at 100 lbs. pressure per setting per hour could be produced. This would amount to 1300 lbs. of steam per ton of coal carbonized, and to 3·87 lbs. of steam per lb. of fuel used in the producer. Deducting from this estimated figure of 1300 lbs. of steam per ton of coal carbonized the average



Waste-Heat Boiler Installation—showing Main Assembly Flue and Branches.



The Downcoming Main and Superheater Chamber on the Inlet to Boiler.

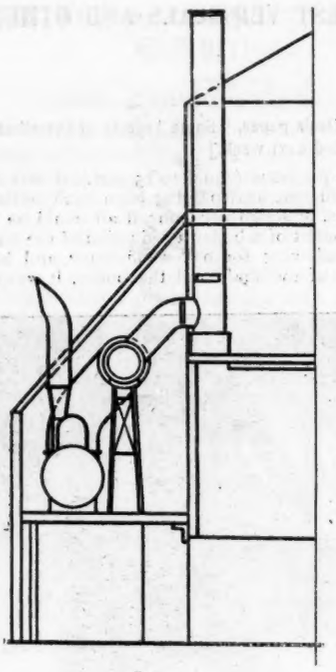


Fig. 1.

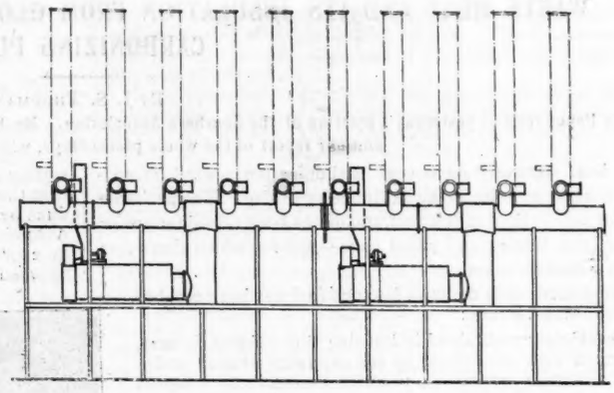


Fig. 2.

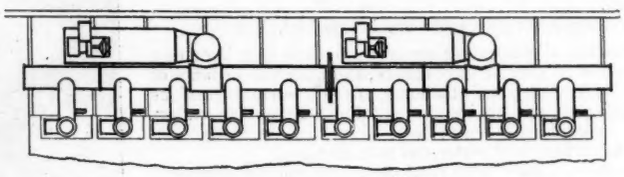
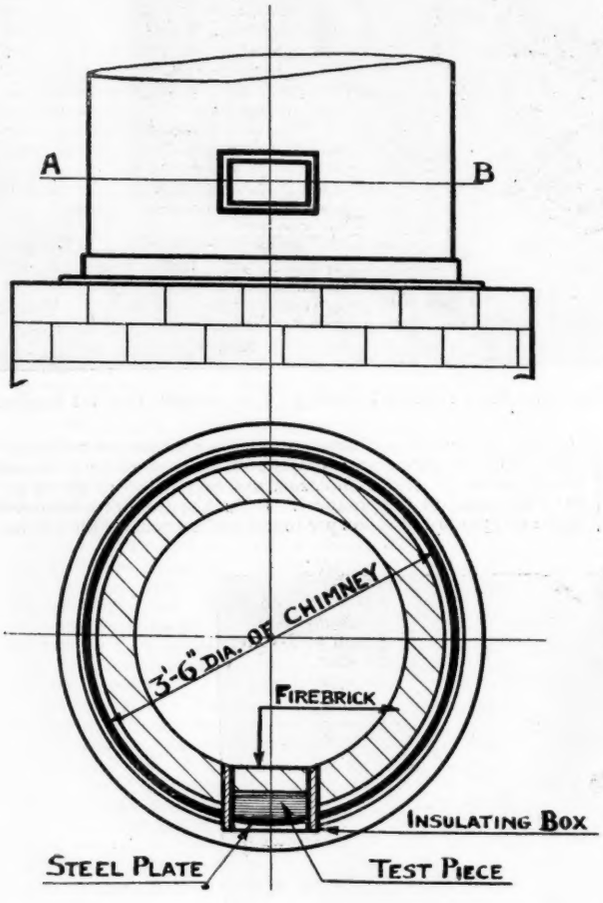


Fig. 3.



SECTION A.B.

Fig. 4.

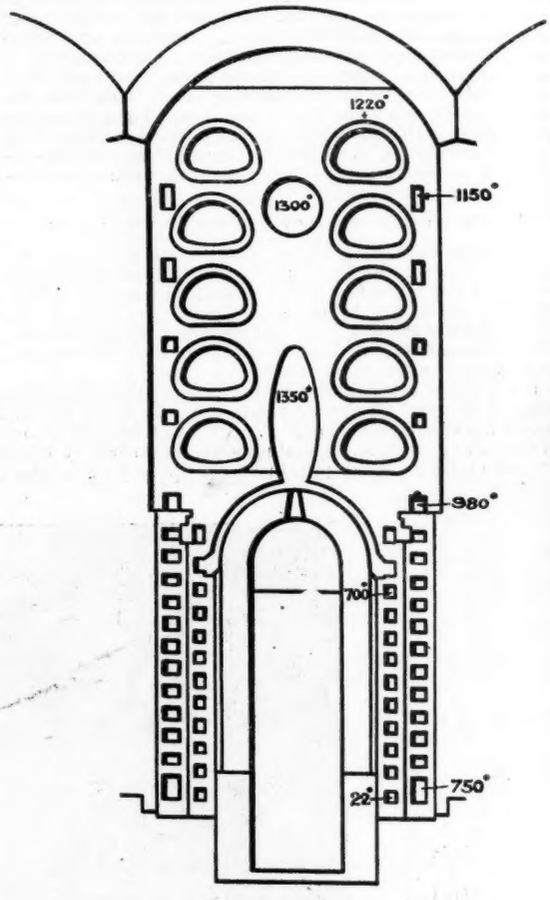
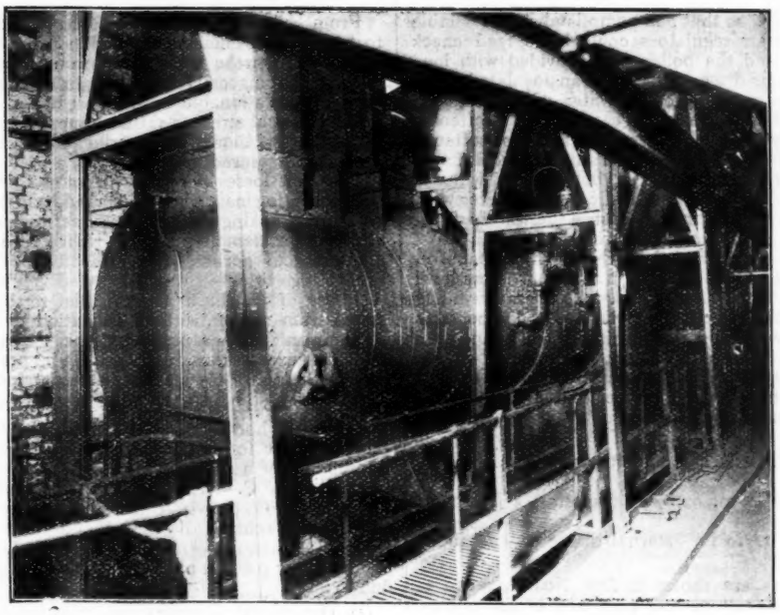


Fig. 5.

amount of steam used for steaming verticals, which at 15 p.ct. amounts to 336 lbs., the quantity of excess steam available for general purposes would amount to 964 lbs.

Steam for general purposes in gas-works practice is usually produced from small coke and breeze in Lancashire boilers giving an average production of 5 lbs. of steam per lb. of fuel. The fuel credit to the carbonizing account for this 964 lbs. excess from waste heat would be $\frac{964}{5} = 193$ lbs., or 1·72 cwt.; and the fuel consumption for actual carbonizing would be reduced thereby from 3 cwt. to 1·28 cwt. per ton of coal carbonized—or from 15 to 6·4 p.ct.

Such saving would appear to be too great to be true, but it is largely due to the fact that steam can be generated from spent gases from the retort-settings in waste-heat boilers at about 90 p.ct. efficiency on the one hand, replacing steam generated from small coke and breeze in hand-fired Lancashire boilers at about 50 p.ct. efficiency on the other hand.



"Kirke" Waste-Heat Boiler of 8000 Lbs. per Hour Capacity, Superimposed on which is the Motor-Driven Fan for Induced Draught.

The author visited several works where waste-heat boilers had been installed in connection with both Glover-West and Woodall-Duckham installations. In the Glover-West plants visited, small vertical waste-heat boilers had been fitted, one to each shaft, in the immediate vicinity of the shaft; a damper being placed in the latter to divert the gases through a branch connection to this small boiler, and thence back to the shaft. The waste gases were pulled through the boiler by natural draught. In this type of installation, the waste gases were not reduced in temperature below 400° to 450° C., and with one exception the capacity of the boilers was only about 500 lbs. per hour; the steam generated amounting to only 1·5 lbs. per lb. of fuel consumed in the producer. The exception referred to was an installation in which a larger vertical fire-tube boiler by Spencer-Bonecourt had been similarly connected, in which about 800 lbs. steam per hour were produced —equivalent to 2·38 lbs. of steam per lb. of producer fuel.

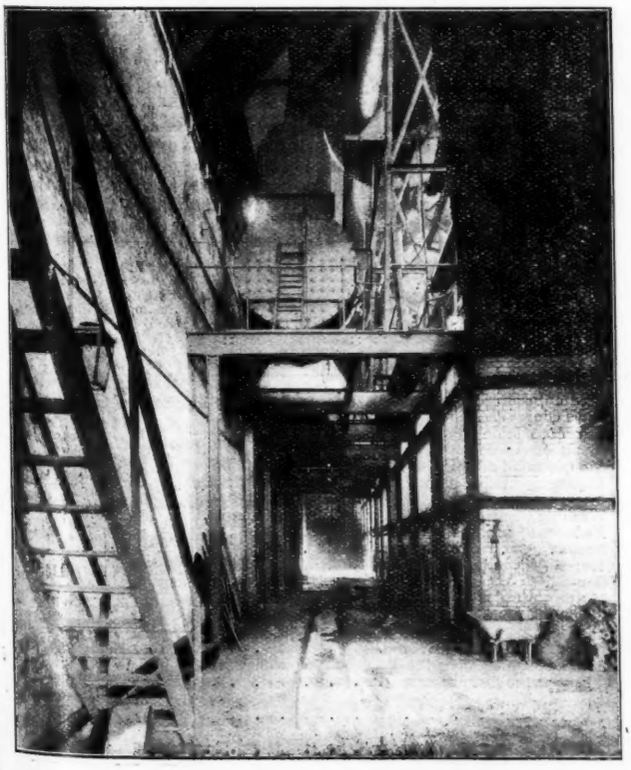
In the Woodall-Duckham installations visited, large-unit Babcock water-tube boilers had been installed at the base of the main shaft of the settings, the main shaft dampered, and the waste gases pulled through the boiler by natural draught. The steam generated amounted to 1½ lbs. per lb. of producer fuel. The author was surprised to find that the maximum production of steam had not been attempted in these installations, and that with over 3¾ lbs. of steam per lb. of fuel available, only 1½ lbs. (or 39 p.ct.) was being recovered from waste heat.

It would appear that the provision of sufficient steam from waste heat, for steaming verticals, was considered so satisfactory that nothing further had been attempted in installations visited.

As previously stated, in the waste-heat boiler installations visited, the waste gases were not reduced below 400° C., whereas by means of induced draught these gases could be reduced, with an efficient boiler of sufficient capacity, to less than 200° C., recovering thereby at least 100 p.ct. more steam.

The following are the reasons which determined the author to recommend the installation of two large Kirke horizontal fire-tube boiler units, with induced draught, rather than the small vertical units with natural draught to each shaft:

(1) The maximum heat recovery could be attained by reducing the waste gases to the minimum temperature practicable, thereby increasing the steam generated by 100 p.ct.
(2) Horizontal type preferable, because in a vertical boiler any scale or sediment deposited falls on to the bottom tube plate, causing overheating and leakage. In the horizontal type any scale falls free from the fire tubes, on to the bottom of the shell.
(3) Kirke fire-tube boiler preferred to water-tube, for (*a*) tubes can be brushed while boiler is at work, and (*b*) less power required for draught than with a water-tube boiler, where the waste gases repeatedly have to change their direction of flow.
(4) The capital cost per ton of steam generated was considerably less.
(5) There would be only two boilers and two feed-water regulators to attend to for the ten chimneys, instead of ten boilers and feed-water regulators with the small boiler unit per shaft.
(6) A larger water surface for steam to come off, ensuring dry steam.
(7) The heat on the operating stage, which is somewhat trying to stokers, is drawn away.



View from the Ground—showing Supports for the Waste-Heat Boilers.

Description of the Stratford Waste-Heat Installation.

Boilers.—Two Kirke patent horizontal fire-tube waste-heat boilers by Spencer-Bonecourt, each 6½ ft. diameter by 17 ft. between the tube plates (approximately 20 ft. over-all length of shell), containing 282 tubes, 1¾ in. internal diameter, giving a heating surface of 2200 sq. ft., designed for a working pressure of 130 lbs. per sq. in., and a steaming capacity of 8000 lbs. per hour. In this type of boiler, the use of high velocity of flow through the fire tubes enables a comparatively small boiler to be made for a big output, and the capital cost to be kept low. The high velocity is compensated for by having the tubes very long relative to their bore. Each boiler is complete with a self-contained fan unit, consisting of a 25-in. diameter "Sirocco" fan, direct-coupled, on a combination bed-plate mounted on the top of the boiler, to a 20 B.H.P. electrically-driven motor by the Lancashire Dynamo Company. The normal load on each motor, when inducing the waste gases of 16 p.ct. of CO_2 from five sets, should not exceed 12 H.P. The motor has a speed range (by shunt control) of 1000 to 1340 r.p.m.

There are two Hayward-Tyler vertical feed pumps, each 6 in. by 4 in. by 6 in.; each pump being of ample capacity to supply

the two boilers at full load, so that one pump is always available as a stand-by. Feed-water regulators control the feed check valves on each boiler; and the boilers are provided with low-water alarms. The pumps draw water from an insulated overhead tank of 1500 gallons capacity for hot water, which has been previously softened to zero hardness in a Permutit water-softening plant—this treatment costs about 1d. per 1000 gallons of softened water—and subsequently heated to 170° Fahr. by the exhaust steam from the gas-pumping station. The hot softened water is measured through a Lassen patent automatic tipping meter with a counter, fitted to this overhead tank, to ensure the water evaporation of the boilers being positively measured.

In order not to interfere with the producer cleaning space on the ground floor, the boilers were erected on a steel structure level with the producer filling stage. This enables the operators filling the producers to keep an eye on the boilers. A damper was fitted to each shaft, below which a down-coming steel connection was made to a larger steel assembly main to each five shafts. Each assembly main is connected to a boiler by a large down-coming main, through a superheater chamber on the inlet to the boiler; all steel connections being brick-lined. The sizes of these connections are:

Top branches, 3 ft. 3 in. external diameter, 2 ft. 3 in. internal diameter.

Assembly mains, 4 ft. 10 in. external diameter, 3 ft. 10 in. internal diameter.

Large down-comers, 5 ft. 10 in. external diameter, 4 ft. 10 in. internal diameter.

The general arrangements are shown in figs. Nos. 1, 2, and 3, giving the end and side elevations and plan, and in the photographs. It will be seen from these diagrams that the area over which the waste gases must travel between the five shafts and the boiler is considerable, amounting to 1777 sq. ft.

Insulation.

Observations were made with the object of determining what would be the loss of waste heat, due to radiation, from the fire-brick-lined steel collecting mains between the base of the chimney shafts, at the outlet of the vertical settings, and the inlet to the waste-heat boilers. Readings of the temperature of the waste gases at the base of the chimney shaft, and further readings 24 ft. higher up, were taken; and it was found that there was a temperature drop in the waste gases passing over this area of 200° C. between these two points. This loss of heat to waste gases exposed to a surface of firebrick-lined steel shaft—equivalent to the surface to which the gases would be exposed between the base of the shaft and the waste-heat boilers—was a serious one, which would reduce the estimated steam production from 1300 lbs. to 975 lbs. per hour per setting.

From these observations, it was obviously necessary to line the steel collecting main with insulating bricks. Various makes of porous insulating bricks were tested; but as it was found that they all shrunk when exposed to a temperature of 1000° C., it was decided that such could not be used for construction work without an inner protecting lining of firebrick. In order to make a practical test of the radiation losses under the actual conditions to which the insulating bricks would be subjected, a rectangular piece of the steel shaft, 10 in. by 7 in., was cut out (as shown in fig. 4) and the 6-in. firebrick lining removed. Into this opening was placed 3 in. of protecting firebrick; the inside being flush with the inner brick lining, 3 in. of insulating brick was then built on to the protecting brick, and, to make the conditions the same as the remainder of the chimney shaft, the piece of steel plate which had been cut away was fastened against the insulating brick.

In order to ensure that no heat was conducted laterally from the adjoining brick lining—which would interfere with the temperature readings—a box of 1 in. insulating brick was formed round the insulating material and firebrick, as shown in fig. 4.

Readings were then taken, and the contact temperature of the steel with various makes of insulating bricks under test was recorded. During the period these readings were made, the temperature of the interior of the shaft and waste gases remained practically constant at 900° C. The surrounding air temperature was also constant at 40° C. Before taking readings, the test bricks were allowed 24 hours to reach a constant temperature. The readings were then made hourly for a further 24 hours, and the results averaged. The readings varied very slightly from hour to hour. The temperatures were taken by a large-bulb mercury thermometer, protected on the outside by asbestos, placed in an immovable position, and checked periodically against a "Bristol" thermo-couple pyrometer during the whole period of testing.

Appended are the results obtained with various insulating materials:

	Contact Temperature. ° Fahr.
Steel shaft with 6-in. firebrick lining, without insulation	360
3-in. solid insulating diatomaceous brick, protected by 3-in. Stourbridge firebrick	230
3-in. porous diatomaceous insulating brick, protected by 3-in. Stourbridge firebrick	157
3-in. porous Kieselguhr insulating brick (*a*), 3-in. Stourbridge firebrick	164
3-in. porous Kieselguhr insulating brick (*b*), 3-in Stourbridge firebrick	158
3-in. porous Kieselguhr insulating brick (*c*), 3-in. Stourbridge firebrick	158
3-in. asbestos brick, 3-in. Stourbridge firebrick	171
3-in. magnesite insulating brick, protected by 3-in. Stourbridge firebrick	170

From the above tests, the porous diatomaceous brick proved to be the most efficient non-conductor, although there was little to choose between it and the porous Kieselguhr varieties. The porous diatomaceous insulating bricks not only gave the most efficient insulation, but were lowest in cost and withstood the test for mechanical strength rather better than the porous Kieselguhr varieties; and though made principally of imported material, they were manufactured in this country.

The heat losses per square foot of this insulating-brick lined steel collecting main were calculated from the outside contact temperature. Taking the lowest contact temperature observed in the above experiments—viz., 157° Fahr., with a 3 in. outer ring of diatomaceous porous brick protected by an inner 3 in. ring of Stourbridge brick—it was calculated that the heat losses between the base of the shafts and the inlet to the boilers would be reduced from 25 p.ct. without insulation to 6 p.ct. with insulation. As the result of these investigations, the writer decided to recommend the expenditure of the extra 3 in. porous diatomaceous insulating lining for the steel collecting mains.

Waste Heat from Regenerative Settings.

In modern horizontal, and several vertical, carbonizing plants, secondary air for combustion of producer gas is preheated by interchange of heat with waste gases, the secondary air being thus heated to 700° C. With a normal combustion-chamber temperature of 1350° C., the waste gases leaving the setting at the inlet to the heat-interchange flues is found to be about 980° C. The waste gases are not generally reduced below 750° C., with a CO_2 content of 17 p.ct., in passing through the heat interchange flues, due to:

(1) The volume of waste gases being twice that of the secondary air.

(2) The interchange of heat through firebrick flues is somewhat inefficient, due to the poor conductivity of firebrick.

(3) In many settings a proportion of the heat units imparted to the secondary air is derived from heat conducted through the side walls of the furnace.

Fig. 5 represents a section of a typical horizontal regenerator setting and producer, on which are shown the temperatures of the setting at various points, the temperatures of the waste gases at the inlet and outlet of the regenerator, and also the temperature of the secondary air after passing through the regenerator flues. These temperatures have been obtained by the author after a considerable number of observations at several works. For correct readings of temperatures below 1000° C., it was found necessary to use thermo-couples, as optical pyrometers gave low readings.

With regenerator settings with more or less inefficient interchange of heat, waste gases of 750° C.—obviously of considerable value—are available for steam raising. With a fuel consumption of 15 p.ct.—viz., 336 lbs. per ton of coal carbonized—it was calculated that there are sufficient heat units in waste gases at 750° C. (17 p.ct. CO_2 content) from this amount of fuel to produce 1100 lbs. of steam at 100 lbs. pressure, assuming the reduction in temperature of waste gases to 200° C. With efficient waste-heat boilers, with induced draught, and well-insulated connections thereto, the losses should not exceed 15 p.ct.; and a steam production of 935 lbs. of steam at 100 lbs. pressure should be obtained per ton of coal carbonized—equal to 2·78 lbs. of steam per lb. of producer fuel.

Power Required on Gas-Works.

In order to determine the amount of power required on an average gas-works, the author made a number of observations on his works. Similar observations were made at other works, showing only slight variation. The necessary power is tabulated herewith, expressed in pounds of steam per ton of coal carbonized, both for works with vertical and horizontal plants.

—	Vertical Plant. Pounds of Steam per Ton Coal Carbonized.	Horizontal Plant. Pounds of Steam per Ton Coal Carbonized.
Coal unloading, elevating, breaking, and distributing	180	180
Coke conveying, elevating, and distributing	45	45
Coke extraction (verticals)	11	..
Steaming (verticals) 15 p.ct.	336	..
Charging and discharging (horizontals)	..	30
Liquor-circulating pumps for retort-house	20	20
Pumping gas and exhausters	65	65
Washing plant, including all tar and liquor pumps	85	85
Boiler-feed pumps	15	15
Shops	50	50
Water distribution	85	85
Pan-ash washing and coke-grading plant	75	75
Mortar mills	30	30
Steam distribution losses, condensation, &c.	70	70
Total required	1067	750
Actual steam estimated to be produced from waste heat at 100 lbs. pressure	1300	935
Balance	233	185
Less power for induced draught for waste-heat boilers estimated at	80	80
Net balance over average requirements	153	105

From the above figures it is evident that there is an appreciable margin of steam that can be raised from waste heat in the average works above the amount required for all power production, and that apart from the demand for steaming verticals, the average works requirements amount to about 750 lbs., the whole of which can be derived from the recovery of waste heat from the carbonizing plant. The greater temperature of waste heat from Glover-West verticals provides the additional requirements for their steaming.

SAVING EFFECTED BY RECOVERY OF WASTE HEAT.

The cost of generating steam per 10,000 lbs. (or per 1000 gallons of water evaporated) at 100 lbs. pressure, assuming 5 lbs. of steam per lb. of fuel, the fuel consisting of 60 p.ct. breeze through ¾ in. mesh at 15s. per ton, and 33 p.ct. over ¾ in. at 30s. per ton (an average price of 20s. per ton) is as follows:

	Shillings.
2000 lbs. fuel at 20s. per ton	17·86
Labour	2·7
Cartage of fuel and ashes	2·0
Steam for forced draught	1·44
	24·00

At this figure, 750 lbs. of steam required for gas-works will amount to 1·8s., or 21·6d., per ton of coal carbonized, which, at 70 therms per ton, amounts to 0·31d. per therm—a saving in manufacturing cost which cannot fail to appeal to gas engineers.

CAPITAL CHARGES OF WASTE-HEAT RECOVERY.

For an installation such as described in these notes for a Glover-West plant, necessitating a considerable area of steel assembly mains and steel structure, the capital charges at 5 p.ct. amount to 1·2d. per ton, the compensation for which amounts to 21·6d.—a sound financial proposition. Waste-heat recovery installation for horizontals, with existing main assembly flues, should cost less than the installation described.

The depreciation of waste-heat boilers, with a constant flow of combustion products at a constant and moderate temperature, will, in the writer's opinion, be less than that of the existing boiler installation.

HEAT RECOVERY FROM SENSIBLE HEAT OF COKE DISCHARGED.

The subject of the recovery of waste heat cannot be closed without reference to the recovery of the sensible heat in coke as discharged from horizontal retorts at a temperature of not less than 1800° Fahr. The continental firm of "Sulzer Heating" have introduced a plant in which the charges of hot coke pass through a large vessel, which is sealed after each filling; any enclosed air being converted to carbon dioxide and nitrogen. These inert gases are circulated through the coke in the sealed vessel, and then through a waste-heat boiler, until the temperature of the coke is reduced to 400° Fahr. Dry coke of good colour, with less breeze, is obtained; and it is claimed that 700 lbs. of steam at 100 lbs. pressure can be generated per ton of coke—equal to 350 lbs. of steam per ton of coal carbonized. The heavy capital cost of such an installation, in addition to the space required, prevents its recommendation.

These notes were written before the completion of the waste-heat boiler installation for the Glover-West verticals at Stratford. The installation has since been completed, and the two boilers put into action. The whole installation went to work with scarcely a hitch, and is running continuously. It is gratifying to report that the calculated estimate of 1300 lbs. of steam per ton of coal carbonized has been considerably exceeded.

The following are the results of a 24-hour evaporation test made with the waste gases from ten sets of Glover-West verticals at Stratford, induced through two Kirke waste-heat boilers:

Coal carbonized per 24 hours (Throughput per retort, 3·03 tons.)	230 tons.
Total fuel used per 24 hours (check weighed)	34 tons 8 cwt.
,, ,, ,, ton of coal carbonized (2½ p.ct. moisture)	2·99 cwts. (335 lbs.).
,, ,, ,, 100 lbs. of coal carbonized	14·95 lbs.
,, ,, ,, hour	3,211 lbs.
Total water evaporated from and at 212° Fahr. per 24 hours	443,874 ,,
Actual steam produced per 24 hours at 115 lbs. pressure	402,790 ,,
,, ,, ,, hour at 115 lbs. pressure	16,783 ,,
,, ,, ,, set per hour at 115 lbs. pressure	1,678 ,,
,, ,, ,, boiler per hour at 115 lbs. pressure	8,391 ,,
,, ,, ,, ton of coal carbonized at 115 lbs. pressure	1,751 ,,
,, ,, ,, lb. of fuel used in producers at 115 lbs. pressure (as fired, 2½ p.ct. moisture)	5·27 ,,
,, ,, ,, lb. of fuel used in producers at 115 lbs. pressure (dry basis)	5·36 ,,
Temperature of feed water	155° Fahr.
Power absorbed by two fans for induced draught	36 H.P.
Equivalent of steam for power per ton of coal carbonized (calculated at 30 lbs. from and at 212° Fahr. per H.P.-hour)	102 lbs.
Steam equivalent for power for induced draught, p.ct. of total raised	5·84 p.ct.
Temperature of waste gases at outlet of setting	882° C. (CO_2 content 16·2 p.ct.)
Temperature of waste gases at inlet of boilers	689° C. (CO_2 content 13·5 p.ct.)
Drop in temperature due to dilution (by air leakage)	149·7° C.
Drop in temperature due to radiation	43·3° C.
Heat loss between outlet of setting and inlet of boilers, due to radiation	4·9 p.ct.
Temperature of waste gases leaving the boilers	225° C.
Tube efficiency of the boilers	90·3 p.ct.

Such results as 1751 lbs. of steam at 115 lbs. pressure per ton of coal carbonized, 1678 lbs. steam per hour per setting, and 5·27 lbs. of steam per lb. of producer fuel used, further emphasize the value and importance to gas engineers of heat recovery from coal carbonization.

The writer confidently anticipates the day when it is general gas-works practice for waste heat from the carbonizing plant to be converted to steam to be used for power, either direct in steam engines, or for steam-driven generators for the production of all electrical (or hydraulic) power required.

The author is indebted to his Chief Engineer, Mr. Thomas Hardie, for sanctioning the reading of this paper, and also wishes to acknowledge the services of his Assistant, Mr. J. Sheridan, and his Chemist, Mr. Cheeseman.

MAINTENANCE.

By S. T. S. MUSGROVE, of Sheffield.

[A Paper read before the Yorkshire Junior Gas Association on Friday, Nov. 16, 1923.]

It will, I think, be readily agreed that it is desirable to increase the sale of gas by every means possible. If so, the question of the maintenance of the various appliances used in the consumption of gas becomes at once of paramount importance. I am quite sure that all of us whose business is on the distribution side of the industry can recall instances where, on investigating a complaint, it was soon discovered that the defect was entirely due to want of proper maintenance. This subject has recently received a good deal of attention from our colleagues in various parts of the country; but, despite this fact, I feel that its importance needs further emphasizing if the consumers we serve are to retain that good opinion of us which is so essential to our future expansion. The appliances we sell or hire are only means to an end—viz., to increase the consumption of gas. Therefore, when the appliance is fixed, we have only taken the first step towards this end. Increased consumption per mile of main depends largely on the condition in which the appliances are kept. Competition compelled us to inaugurate some system of maintenance, originally for lighting; and the same competition may (if not immediately) make it necessary to give increased attention to appliances used for all other purposes. It is obviously much easier to obtain new business from a consumer whose appliances are kept in proper order, and who knows he can rely on certain results year in and year out; and this is only possible if those appliances are periodically inspected and systematically overhauled. I fear that, in a number of undertakings, this question of maintenance is still not considered as important as is necessary. The selling of additional appliances is desirable; but I feel that every attention possible should be given to the appliances which are known to have been in use for a number of years.

It should be part of the maintenance system to endeavour to persuade the consumer to have his appliances "modernized," if by so doing he can obtain greater efficiency and better service. If this modernizing is not an economic proposition, then an endeavour should be made to scrap the old apparatus, and instal something of more recent manufacture. As the various undertakings come under the Gas Regulation Act of 1920, which, among other things, necessitates the distribution of gas of a constant thermal value at a minimum pressure, it should not be difficult with periodical maintenance to ensure that satisfaction which is our constant aim.

LIGHTING APPLIANCES.

If we are to retain the lighting load we have, and obtain a proportion of the new business which becomes available from time to time, regular attention to burners, mantles, and glassware is necessary. In this connection I should like to suggest that the time is opportune to consider the possibility of adopting some standard type of burner for domestic lighting. Such a burner should, I think, have a fixed nipple capable of passing a given quantity of gas at a stated pressure, and with air holes suitably proportioned to give the correct mixture, on the lines of the "Metro" burner. If such a burner—preferably of the superheater type, with small mantles, and screened with vitreosil ware—could be produced at a competitive price, it would command a ready sale, and would reduce the necessity for maintenance to a minimum. If this could be done, it would certainly be a point which would be quickly appreciated by the consumers, for the necessity for adjustment—even if only occasional—is considered irksome by those who are not familiar with burners. For the

satisfactory lighting of workshops, factories, and public buildings, regular maintenance of the burners and all their parts is essential. In this connection it is necessary, when recommending new lamps, burners, and fittings, only to put forward those goods which are simple in construction, and which consist of few parts. These parts should be easily detached, readily assembled, and of such a nature that the owner can, if necessary, clean them himself. While I am an advocate of all maintenance remaining in the care of the gas undertaking, it is an advantage, particularly in industrial premises, for the user to be able to make small adjustments *in situ*.

Cooking Appliances.

The domestic cooker, once it is properly fixed and adjusted, needs very little maintenance. Most of the complaints received are due to want of ordinary care and attention, and are easily remedied. With the larger apparatus used in hotels, canteens, &c., periodical maintenance at convenient times is certainly necessary. Appliances in these establishments, generally speaking, do not receive that care and attention which they deserve from those who constantly use them.

Gas Fires, Radiators, &c.

These need occasional attention if efficiency is to be maintained. With inset fires, which are very popular in this part of the country, regular cleaning and adjustment is required. The amount of dirt, &c., that collects in the burners is surprising; and it is therefore desirable that the burner should be readily detachable, without the necessity of removing the whole fire. With radiators of the gas-steam type, the thermostat and burner are the parts that usually need occasional maintenance.

Water-Heating Appliances.

Under this heading I would include circulators, geysers, boilers, and heaters for making beverages. These, if constantly used, require periodical attention by competent men who are familiar with their construction. Burners, waterways, and flues all need to be thoroughly overhauled and cleaned if satisfactory service is to be assured. The efficiency of these appliances is soon reduced unless the various parts are free from deposits, &c. Here again it is an advantage only to recommend those appliances which consist of few parts readily dismantled for cleaning purposes.

Industrial and Power Appliances.

In most undertakings the apparatus under this head—viz., furnaces, engines, steam-raising plant, &c.—receives attention from specially trained men. Burners and flues need regularly cleaning, and attention must be paid to the brickwork, if the utmost efficiency is to be ensured.

Standardization.

In connection with this question of maintenance it is desirable briefly to mention the standardization of appliances. This matter is receiving attention from the manufacturers, and I feel sure you will all agree that if it can be adopted throughout a district department it will tend to simplify and cheapen any maintenance system. If it is possible to limit the variety and makes of burners, cookers, fires, &c., which are sold or hired by any undertaking, many advantages are gained. The fittings staff become familiar with the goods, and are therefore able to rectify any fault more quickly. The fitters soon learn the names and numbers of the various items required, and are able to describe them accurately. The number of spare parts it is necessary to keep in stock is less; and this enables the stores readily to issue them when required. These advantages all tend to expedite the work done, and react favourably on the total cost of the department.

The important question now arises as to who is to bear the expense incurred in the work of maintenance. Opinion on this point is divided into two classes: (1) Those who consider that the cost should be borne by the undertakings; and (2) those who consider that the consumers should pay. Much can be said for each of these views; but before a decision is arrived at, the nature of the area of supply must be considered. In residential towns, where the demand for gas is almost entirely for domestic purposes, "free" maintenance may be considered justifiable. It enables the undertaking to keep in close touch with consumers, and creates the feeling that the concern is intensely interested in each consumer, and is anxious that the various appliances installed should be always in such a condition that maximum efficiency is obtained. The "gas man" is a welcome visitor, and, generally speaking, his services are appreciated. Consumers seek his aid directly an appliance shows signs of needing attention; and the cost per consumer is therefore not excessive. On the other hand, in industrial towns, where a considerable portion of the load is used for furnace-heating and power, and where competition with other fuels is an important factor, the selling price of gas must be kept as low as possible, in order that every inducement may be given to encourage manufacturers to adopt gaseous fuel wherever heat and power are required. Entirely free maintenance, therefore, under these conditions is hardly possible.

Where a charge is made for maintenance, it is found that, in many instances, consumers continue using appliances when they are not in a condition to give the best results, and are loth to call in the gas undertaking—entirely on the score of expense, though in many cases it would be an economy to do so. Domestic consumers usually expect a certain amount of free maintenance; and in an area where it is not forthcoming they are not very much impressed if the low price at which gas is sold is emphasized. It therefore seems to me that in such an area there is much to be said for the compromise adopted by some undertakings which only charge for the materials used. By this method it is possible for the undertaking to keep in touch with the majority of the appliances on the district at a minimum cost; and I think it will be found that, where such a system is in operation, the consumer is usually willing to share the cost of any necessary attention.

Hire, and Hire-Purchase.

A further point to be considered is the difference between goods purchased outright and those hired or hire-purchased. Where appliances are let on simple hire or on hire-purchase terms, and remain the property of the concern (in the latter case until the last instalment is paid), these must be maintained by the undertaking; and the charge for hire (or hire-purchase) should include this. In the case of change of tenant it is usually found possible to overhaul and clean the appliance *in situ*.

Prepayment Fittings.

Whichever system of maintenance is adopted, the appliances which are the property of the undertaking must be maintained free of charge, and a limited number of renewals made on a change of tenancy. This is usually covered by the amount charged for gas. The intervals at which visits should be made will vary according to the description of the appliance, the conditions under which it is used, and, not least, on the care given to it by the user. With lighting fittings for domestic use, monthly visits should be sufficient. For industrial establishments it is necessary to pay weekly visits, for where machinery is in use, or dust abounds, the burners, &c., need frequent attention. With cooking and water-heating appliances it is usually found desirable to pay quarterly visits, in order that satisfaction may be ensured. With heating appliances a yearly visit should in most cases suffice. With industrial and power appliances no definite interval can be given, for the uses to which gaseous fuel is applied are so varied.

I would, therefore, emphasize that it is necessary that some system of maintenance should be adopted by every undertaking, large or small, as being the best and most desirable means of keeping in touch with the consumers. Only by this method is it possible to ascertain not only that the appliances are in proper condition, but that their use is correctly understood, and that the consumer is obtaining the maximum efficiency and satisfaction. This alone will ensure that every appliance installed is used on every possible occasion because its use is the readiest and easiest means of obtaining the desired result.

Discussion.

The PRESIDENT said it could hardly be denied that nowadays maintenance was absolutely necessary in regard to the appliances by which gas was used, but particularly the domestic appliances. Very few people seemed to go out of their way to pay the slightest attention to a little cleaning of their own burners or the maintenance of mantles in good condition. It would be a real advantage if an appliance could be fitted to all burners so that, when there was a decrease in efficiency due to dirty burners or broken mantles, the light was automatically cut off entirely, so that the notice of the consumer would be drawn to the fact that some attention was required, and would not merely continue putting up with a bad illumination and increasingly persuading himself that gas lighting in general was no good. Under ideal conditions of gas pressure, he was certainly in favour of fixed nipples; but to have satisfaction with them, they must have constant pressure and constant calorific value. In many districts—especially hilly areas—they would need hundreds of district governors to attain constant pressure, and he was afraid this was hardly as practicable as the fixing of adjustable nipples to the burners. He entirely agreed that, unless the gas industry tackled the question of maintenance seriously, gas would be "out of it."

Mr. J. B. BALMFORTH (Bingley) entirely agreed that the industry must give the best possible maintenance; but with regard to the fixed nipple he was not entirely in agreement, because they had to remember that pressure did vary, even though they tried to keep the quality of the gas constant. In most areas they would require perhaps thousands of district governors to avoid the variation of pressures. The little needle regulator on an incandescent burner, once set, was in effect a fixed nipple unless it was tampered with. They all knew that the attraction of dust was one of the biggest bugbears in gas lighting, and half a turn of the needle regulator dislodged and removed the dust. In the matter of payment for maintenance, the consumers must pay eventually, either individually or collectively. Personally, he believed in big institutions paying direct for the maintenance service, on the basis of some fixed figure—a very low figure when one considered the service involved—per year. He put this into practice in his own undertaking; and if the consumption of glassware was excessive, he wanted to know why. He did not, however, think the small domestic consumer would appreciate a definite maintenance charge being made. The meter inspector, in the case of the household consumer, could do a great deal. If the consumer complained of a poor light, the inspector could easily adjust it, and could many a time retain a consumer. Inspectors should have it impressed upon them that this little attention to the consumer was valuable to the undertaking, even if the time involved meant that he had to read a few less meters in a day.

Mr. F. A. C PYKETT (Halifax) said they were all agreed with Mr. Musgrove that in practically every instance of complaint they would find the trouble was either that the appliance had been improperly fixed or that there was a want of maintenance. At Halifax they had adopted the standard burner. It was loaned to the consumer, who purchased the mantle and glassware. If he complained about any burner in the house, a similar burner was supplied. In regard to Mr. Musgrove's

observations as to inset gas-fires, he (Mr. Pykett) had noticed that they seemed to require more attention than the ordinary gas-fire. Dust and dirt dropped down the chimney and on to the burners. He had examined some of the dirt, and found the bulk of it was lime from the mortar between the bricks. He had wondered, therefore, if there was some effect from the gas fumes on this lime, causing it to crush into powder and fall into the fire. As to furnaces, they found in Halifax a certain amount of difficulty in getting to know what was the cause of complaint, and in getting into the place. Again, some of the workers who were in charge of these furnaces were very reluctant to admit improvement. He remembered only a short time ago there was a complaint about a small muffle furnace; and as soon as he saw it, he knew it wanted re-lining. He found they had had it 16 years, and it had never been re-lined. The gas department re-lined it on approval, and it was so improved that the man was able to get seven melts where previously he had five; and there was a marked gain in every way, though the man in charge was very loth to admit it. In regard to standardization of fittings, he would like to know whether Mr. Musgrove thought the makers were doing all they might to bring this about. Almost every day there seemed to be some new feature on the market, some little addition to existing appliances, and it was not easy to think they were always really for the better. Improvement was needed in the small fittings of gas-cookers, especially taps. There were not many modern cookers on which the taps would be reasonably tight after three months' service. If one examined a cooker tap of the older type, there was really some good metal in it, but there seemed to be precious little to-day. Mr. Balmforth had suggested that meter inspectors should attend to consumers' burners. Had Mr. Musgrove contemplated the idea of combining the duties of meter reader and maintenance man? Personally, he thought the duties could probably be combined.

Mr. J. W. LUPTON (Otley) was not in favour of the fixed nipple. If one had a gas and air adjustment, one could get the best possible result out of the gas. Fixed nipples, to his mind, could never be a success, even if the pressure was always constant. The pressure might be constant in the main; but, owing to the arrangement of internal fittings in the house, they could not possibly get the same pressure at every burner-point, so that the adjustable nipple was necessary. They must, of course, aim at the standard burner as far as they could. On the question of cost of maintenance, it seemed to him that the thing was to have the right man going round on the job. The maintenance could be worked on the lines of free service so far as men's time was concerned, but the mantles and glassware should be charged for at a reasonable profit; and it was always up to the man on the job to introduce new burners where they were necessary. Had Mr. Musgrove had much experience in the matter of cooker ventilation, which sometimes gave trouble? Had he experienced old-type cookers, made in pre-war days, which under present conditions were apt to be badly ventilated, even to the extent that when the oven door was closed the flame was gradually smothered out? Probably this trouble was due to the nipples having been opened out owing to the difference in the quality of the gas since pre-war days, and now insufficient room for the products of combustion to get away.

Mr. A. H. CLUCAS (Leeds), speaking on the subject of fixed nipples, said there was objection in the composition of the gas as distinct from the heating value. If the composition were altered, they altered the configuration of the flame. This, of course, might not affect small concerns so much as large ones.

Mr. C. H. CHESTER (Southbank) said Mr. Musgrove had struck a high note when he mentioned the need for constancy of gas quality. It would save a great amount of maintenance expenditure if they could confine elements of variation to something like 2 p.ct. This ought to be possible in most works; and with that small variation there would not be a great need of maintenance expenditure with any apparatus. He was with Mr. Musgrove, too, on the need for as much free maintenance as was practicable; but he could not agree with him in regard to the fixed nipple, because of the varying pressures. Had any attention been given to flame shape? This was where an adjustable nipple usefully came into play. In his own case, they had adopted a three-light cluster as the standard, and found a very satisfactory flame shape, giving an efficiency better than any other type. The bijou burner was one worth universal adoption.

Mr. T. N. JACKSON (Wakefield) said there was no doubt that the question of maintenance was increasingly important. At the beginning of last season they established in Wakefield a maintenance scheme under which they gave the labour free and charged only for materials supplied. They would write to the consumers whom a man hoped to visit, informing them what the man was going to do. If the consumer did not want the visit, he could say so. Otherwise the man went to the address, equipped with various appliances to maintain lighting fittings, and to make any adjustments required; but it must be admitted, as Mr. Pykett had mentioned, that there was a rather surprising difficulty in getting into the consumer's premises in some cases—even into houses. In regard to fixed nipples, there had not that afternoon been any mention of them in relation to public lamps. In Wakefield fixed nipples on the public lamps seemed satisfactory.

Mr. J. W. ROPER (Bradford) remarked on Mr. Chester's observations as to flame shape. Personally, he thought this had everything to do with the efficiency of the lighting. In almost every case of cluster burner one would find that the nozzle went deeper into the mantle than that of the universal size burner. The best flame was a short-coned flat-bottom flame, with well rounded sides.

Mr. PYKETT said they had fixed nipples in the public lamps of Halifax, and found them fairly successful, despite the great variation of altitudes. They zoned the district into areas according to altitudes, and secured fairly constant pressures by this means.

Mr. LUPTON, in the case of public lighting, regarded fixed nipples as very good, because they were close to the main, and the pressure was fairly constant. With regard to the standard burner, he thought the three light superheated bijou cluster burner was the one to adopt. It was, in his view, the industry's mainstay at present.

Mr. BAILEY (Cleckheaton) thought the fixed nipple, especially in the inverted light, was liable to be a deterrent. The gas carried with it small dust particles, and with an adjustable nipple this slight dust dropped through. Perhaps with the upright burner the fixed nipple might be better, because dust was not carried through to the same extent. He was strongly in favour of the small-sized mantle; the small flame, which was more intense, therefore increased the luminosity. Even under poor pressure the mantle was illuminated all over. Apart from moving the dust with an adjustable nipple, it had to be remembered that the gathered dust went somewhere—either into the gauze in the nozzle or whatever other arrangement there might be—and maintenance was a very important matter from this point of view. He was greatly in favour of free maintenance for domestic consumption.

Mr. F. CLEGG (Huddersfield) asked Mr. Musgrove whether he would prefer to use the existing meter inspection staff for maintenance work, or to set up a special staff. It had been suggested that meter readers could do the work in the course of their rounds; but he thought this was opening up a serious difficulty. The meter reader might do a considerable quantity of adjustments one day, very few the next, and perhaps none another day, and therefore his meter reading per day would be very irregular. What sort of check could be put on the amount of work the meter readers did? What would Mr. Musgrove consider the best way of dealing with the human element in maintenance? With his own undertaking, the work was not done in the course of the ordinary rounds. The meter readers discontinued their normal work to take a periodical census of the appliances in use by consumers, and then they did small adjustments.

Mr. J. W. HORWILL (Bradford) believed they were all agreed that maintenance must be undertaken in some form or another. The question as to whether it should be free or not depended largely on what quantity of business they were losing by discontented consumers going over to electricity. He did not think it could be done satisfactorily through the meter inspectors; and if it were, they would ultimately have to increase the staff to cope with the reading, so that it would come to the same thing as appointing a special maintenance staff. In a rough way, he thought an addition of 1d. per 1000 c.ft. to the price of gas would more than cover the cost of labour of the maintenance staff.

Mr. MUSGROVE, replying to the discussion, noted that the question of the standard burner had raised a good deal of discussion. His argument on this point was based on the assumption that the Gas Regulation Act would necessitate their supplying a gas of a constant B.Th.U. value, within very narrow limits. The question of pressure was also covered by the Act. It was possible to make a gas of a constant B.Th.U. value within very narrow limits, and it was possible to supply this gas under a fairly constant pressure. Bearing these conditions in mind—conditions which would soon be universal—he thought, even if it was not opportune at the moment, that a standard burner would be practicable. There were such burners on the market, especially for street lighting. A fixed nipple would take up a certain amount of variation, both in quality and in pressure. He was still hopeful that before long they would get this standard burner, and that it would be satisfactory. In regard to maintenance, it was not desirable that the work should be done in the ordinary course of the meter reader's operations. It would be far better to have special men for the work. Perhaps where meter readers were not kept fully employed throughout the quarter, it might be arranged that a definite portion of their time be devoted to meter reading and a definite portion to maintenance. It was certainly difficult sometimes, and particularly in industrial establishments, to find out exactly what was going on in connection with the appliances, unless a definite complaint was sent in and a man asked for. He agreed with Mr. Roper as to the mantle and the shape of the flame. That was why he was in favour of the smaller mantle, which was generally of a better shape to contain the flame. For this reason the superheater burner was going to be of great value to the industry. In regard to dust and dirt getting down the chimney and on to the burners of inset gas-fires, he had hoped this was a problem peculiar to Sheffield. He did not think there could be a worse town in England for the disintegration that took place inside the house chimney. The products of combustion of a gas-fire contained a certain amount of moisture, and he believed it was this moisture, acting on the mortar inside the chimney, which caused it to disintegrate and drop the lime on to the burners of the fire. That was one of the reasons why he suggested the desirability of taking the burner out to clean it without being forced to take the whole fire out. In Sheffield they fixed a sheet of iron which threw the dirt to the back of the brick. This had to be taken out periodically, but it kept the dirt very much from the burners. In the matter of cooker ventilation, he could not say he had had much experience of this smothering of the flame, owing to the flue being of inadequate size, though he had come across it where the flue had been partially choked or where there was a baffle in the flue which tended to confine the products of combustion in the upper part of the oven. He thought the point in the matter was to see that the nipples were not too large. The average fitter, he was afraid, tended to err on the side of making them too big. If the nipples were of the right size, and did not pass too much gas, he did not think that, even in a cooker up to 15 or 16 years of age, there should be any difficulty in getting the products of combustion away. It was no use judging a flame when the door was open; it must be done when the cooker door was closed.

A Seven-Million Vertical Retort Plant at Fulham.—The Gas Light and Coke Company, London, have placed a contract with West's Gas Improvement Company, Ltd., for an installation of Glover-West vertical retorts, having a total capacity of 7 million cubic feet of gas per day. The plant is to be installed at the Fulham Works.

Society of Engineers.—The fourteenth annual general meeting of the incorporated Society will be held at 6 o'clock on Monday, Dec. 10, in the offices, No. 17, Victoria Street, S.W. The business will include the announcement of the result of the postal ballot for the election of Council and officers for 1924, and of the awards of premiums made in respect of papers published in the Society's "Journal" during this year.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Lecture by Mr. Frederick Dye.

There was a well-attended meeting of members at the Westminster Technical Institute, S.W., last Friday evening, under the Presidency of Mr. Walter Grogono, who said they were fortunate in being promised a lecture by a thoroughly practical man upon a subject of great importance to the industry. He then called upon

Mr. Frederick W. Dye (of Messrs. John Wright and Co.), who proceeded to address the meeting on

THE GAS BOILER (OR CIRCULATOR) AND ITS APPLICATION.

In the event, the anticipation that the lecture would prove of great educational value to many members, and of interest to all, was amply fulfilled. Mr. Dye based his remarks upon the contents of an illustrated booklet issued by Messrs. John Wright and Co., and distributed at the meeting, so that members could further study at their leisure various points raised by him.

Cost of Heating Water by Gas.

Mr. Dye first touched upon the question of the cost of heating water by gas. A warm bath, he said, costs, where gas is under 4s. per 1000 c.ft., or 1s. per therm, 2d.; but that is for a minimum bath at minimum temperature—say, 20 gallons, at 100° Fahr. The majority of people are not satisfied with a temperature of 100°, and perhaps not with a quantity of 20 gallons. Therefore it is necessary to say 2d., 2½d., or, if you want a really nice bath, 3d. The last-named is not a lot, and it is a true figure. It is a practical figure, and one that is obtainable in the consumer's house. Mr. Dye has arrived at a very helpful figure to use when calculating the cost of water heating by gas, and one which will answer many questions. It is necessary to concentrate on getting water heated to 140° or 150°, according to the time of year. That is the water—it may be termed "dish-washing" water—which is required most often. Now, to heat water from average cold to 140° or 150°, takes 3 c.ft. of gas per gallon. This is a very reasonable figure. It means about 55 p.ct. efficiency for the boiler; but it has to be remembered that this is what they would be getting at the point of use.

Circulation and Flues.

A point to which the lecturer drew attention was that the circulation in connection with gas-heated apparatus can be too rapid. How much apparatus, he went on, has been condemned through taking too long to heat the water, wholly on account of the circulation being too fast? When, therefore, the circulation is too rapid, it must be retarded by some means; and it was shown on the blackboard how a regulating tee on the return pipe will do this. At the same time, while "dish washing" water as rapidly as possible should be aimed at, provision for this requirement must not be overdone.

Mr. Dye's next point had reference to flues, as to which he pointed out that a gas-boiler, like a coal fire, without a reasonably effective chimney or flue is uncertain in action, and possibly may be a complete failure. Generally speaking the best chimney, when it can be utilized, is the kitchen range chimney. As it is nearly always the most-used chimney in the house, up-draught is good and constant; so that by connecting the gas-boiler flue to the kitchen chimney, draught troubles are likely to be avoided. When the kitchen chimney is not available, and another of the house chimneys may be used, inquiry should be made whether this chimney has a fire burning at the base of it in winter. The products of combustion from a gas-boiler are more concentrated than those from a gas-fire, which are diluted with ventilating air, and therefore are more favourable to condensation of the water vapour if cooled. Consequently, in a high and cold brick chimney in winter, the water is deposited and soaks into the brickwork. This may, of course, prove a troublesome matter, for the moisture gets through the wall and may injure decorations. This has been known to occur with a kitchen chimney, the coal range of which was never used. Condensation of water vapour in the chimney will not occur in those chimneys which have the heat from coal fires for the winter half of the year.

When a brick chimney is not available, the flue from a boiler has to be entirely pipe. Generally this means carrying a pipe 2 or 3 ft. vertically from the flue nozzle on the boiler, then through the wall to the outside. Outside, the pipe is arranged to turn up again, and is fitted with a conical cap on top. It is commonly believed that this cap prevents the wind blowing down the pipe, but this is not the case; its purpose is to prevent rain from entering, &c. If the fluepipe is arranged in this manner, the wind will force its way down it, and interfere with the proper burning of the gas.

Down blow at the boiler may occur from one or two causes. It may arise from the pitching of the wind on to a chimney which terminates lower than the roof of the building, or lower than an adjacent building, trees, &c. This causes air to be impelled down the chimney, temporarily reversing the direction of the draught. Secondly, when a pipe chimney terminates at or near an outside wall, down blow is caused by wind pressure. The wind blows against the wall where the fluepipe comes through, and, meeting the wall, experiences some resistance. As the wind continues to blow, the resistance causes a slight pressure to be exerted in every direction. This results in the wind forcing its way into the flue opening, and discharging down the fluepipe, reversing the direction of the draught. It matters not what kind of cowl or fitting there is on the end of the fluepipe, it offers no resistance to this wind pressure, for it simply amounts to being a hole in the wall. There is in connection with chimneys another important point which has to be dealt with, and that is strong draught. Strong draught in the chimney or pipe may also adversely affect the working of a gas-boiler, resulting in low efficiency. In cases of very tall chimneys, the draught may be considerable, if connected up direct to the flue nozzle on the boiler. A strong draught may cause a considerable amount of cold air to be pulled through the boiler as well as through the lower opening of the nozzle.

The correct method of connecting up the flue to the gas boiler should prevent the ill-effects caused by down-blow and of strong draught on the boiler. After long experience, it has been found that the most satisfactory method which fulfils these two conditions is the introduction of a tee-piece into the flue pipe on the inside of the building. This should be fitted not less than 2 ft. 6 in. above the flue nozzle, and not more than 6 ft. The horizontal arm of the tee should be connected by means of an elbow or bend (preferably the latter) to the vertical flue from the flue nozzle; the upper end should be connected to the flue proper, while the lower end is left open.

Excessive Consumption.

The ill-effects from an efficiency point of view of excessive consumption were next emphasized by Mr. Dye. Half the complaints of gas-boiler installations that come along, he thinks, are due to this cause. There are hundreds of boilers giving bad service, and making high gas bills, solely from this cause.

The Economy Valve and the Thermostat.

A short history of the "Economy" or cut-out valve was given by the lecturer, who afterwards demonstrated with the thermostat. It is, he said, becoming more widely recognized that there are two different demands for hot water in practically every house. There is one for hot bath water an hour per day, or an hour per week (or even less often); and this represents the largest volume, which governs the size of cylinder installed. The other demand is for hotter water in smaller quantities for dish-washing and other purposes, seldom exceeding about 3 to 4 gallons, and occurring at all times, a hundred hours per week. For this latter requirement, a storage of 5 gallons is ample (provided it is kept hot); yet, ordinarily, a storage of 20 to 40 gallons is heated and kept going at all times for this 3 to 4 gallons demand. This occasions waste of gas and loss of time. By means of the "Economy" valve, bath water in full bulk may be had whenever required, but at all other times the storage is reduced to 5 gallons, which is quickly heated, and always hot. It allows of dish-washing water (140° Fahr.) being available within fifteen minutes after lighting the gas, starting cold. When the 5 gallons of water is hot, the thermostat shuts the gas down.

Showing, by means of alternate dips into hot and cold water the extreme sensitiveness of the metallic thermostat, Mr. Dye declared that he has seen one that has been used for a period of over 25 years. His opinion is that, without the addition of a thermostat, the gas boiler has no future worth mentioning.

Heat Losses.

Heat losses from circulating pipes may, the lecturer told his audience, be enormous; but by covering the pipes, this loss can be reduced as much as 80 p.ct. As will be realized, however, there is often a difficulty in properly covering the pipes. Am I, asked Mr. Dye, going too far in expressing the belief that some day the man who fixes a boiler will be skilled in covering pipes with plastic composition? Really the only trouble in doing this is in making a clean finish with it. It could be done cheaply, and would make a great difference to the gas-boiler.

Boiler Level and System Sketches.

Just two more of Mr. Dye's practical hints may he noted here. The first was—when fixing a boiler put it on a stand, so as to raise it well off the floor. The best height is one that will allow of an inspection of the burner without stooping; but even 6 in. from the ground is better than on the floor. A boiler on floor level is probably hated by the person who has to attend to it.

The second point was that, in inspecting a house in connection with a gas-boiler installation, it is well to make a sketch of the hot-water system. This is likely to prove most helpful, as one cannot afterwards remember everything seen in the course of a short inspection.

At the conclusion of the lecture, a number of practical points were raised by different members present, including Mr. A. D. Billingham (Gas Light and Coke Company), Mr. D. C. Cross (Lea Bridge), Mr. W. E. Brown (Gas Light and Coke Company). The replies to the questions raised by these and other gentlemen added further information of a useful character to the substantial amount which Mr. Dye had already imparted. Some of the remarks of a more general nature are briefly noted below.

Discussion.

The President remarked that they had had a very interesting talk on the subject of the gas-boiler, and Mr. Dye had been extremely honest with them. Really it was the troubles connected with the matter of water heating by gas which they wanted to get down to. The

question of flues had been discussed by the Association before, and it was one which many members closely studied.

Mr. D. J. WINSLOW (Lea Bridge District Gas Company) thought they should consider themselves very fortunate in having Mr. Dye to come and address them on this important matter. Their trouble was that so often fitters, builders, and other people who engaged in this class of work knew so little about it. In this respect, he referred to the intensely practical man, who had not given sufficient time or attention to the ordinary physics of the subject. Physics should form a large part of the education, especially of the distribution man. There were so many pitfalls in a subject of this kind. The use of the regulating tee explained by Mr. Dye to prevent the too rapid circulation of water, was a new point to him; and he would suggest that this device should be put in the hands only of the expert. He would like to ask Mr. Dye if he had been trying to bring the circulator up on a par with the geyser, in the matter of the time factor. He did not see how it could be hoped to equal the geyser in this respect, when they were only putting through one half to two-thirds the quantity of gas per hour. It was apt to be a drawback with circulators that they were not quite fast enough, though they had, of course, been speeded up in recent years. For this reason, most of them tried to get the larger kinds installed. Could Mr. Dye refer them to a first-class cut-out valve which would not stick? In connection with the subject which they were discussing, condensation was one of the biggest problems they had to deal with. It was most distressing to find a boiler installed on the floor level.

Mr. DYE replied that the circulator could not compete with the geyser for speed; but what it could be made to do, even with a 40 c.ft. burner, was to give 1 or 1½ gallons of high-temperature water in 10 minutes. It would give 5 gallons in 25 minutes. He had not himself run up against a cut-out valve that had stuck; but probably all valves would do so if they were not used.

Mr. W. L. WESTBROOK (North Middlesex Gas Company), alluding to down draught, pointed out that if this reached the burner of the boiler, it would be a very serious matter; and unfortunately these boilers were sometimes fixed by people who had not had much experience of them. Would it not be wise to get the injector away from the combustion chamber? With flue outlets into the roof of a house, it was necessary to have efficient ventilation. If the roof was close boarded or felted, back pressure would result.

Mr. DYE agreed that they wanted to get the injector as far as possible from the combustion chamber, and said he was much obliged for the suggestion. He then proceeded to explain a number of sketches illustrating proper and improper methods of fitting supply and draw-off pipes in tanks and cylinders. Continuing, he said "Urastone" (Uralite-Asbestone) flue pipe had been found excellent in the prevention of condensation. The British Uralite Company had now a cowl, or something of the kind, which it was claimed would prevent down draught in any circumstances.

Mr. H. W. KERRIDGE (Croydon), proposing a hearty vote of thanks to the lecturer, said they must be careful what they told consumers as to the consumption required by gas-boilers, and also as to the size of boiler that should be installed. His Company had used "Urastone" material for more than twelve months, and it had been found eminently satisfactory. Difficulty with condensation had been eliminated.

Mr. WINSLOW seconded the vote, with the remark that what Mr. Dye did not know about water heating was not worth knowing. They all hoped that on some future occasion he would come again and give them a lecture on heating buildings by hot water and gas circulators.

Mr. DYE said he appreciated highly his kind reception. He advised young men to study hot-water work, for this branch was not overcrowded, and it was not badly paid.

Impure Gas Prosecution.—At the Alfreton Police Court on Friday, the South Normanton Gas Company were summoned by the Derbyshire County Council for supplying gas which did not conform to the provisions of the Gas Regulation Act, 1920, as to purity, in that on Oct. 24 it contained sulphuretted hydrogen. On behalf of the County Council, Mr. H. W. Skinner said the presence of sulphuretted hydrogen in the gas was due either to neglect or an inadequate plant. For the Gas Company, Mr. H. R. Cleaner pleaded for leniency, and said they had a small gas plant and could not afford to employ a qualified chemist. It was now thought that the Manager had taken the necessary steps to put things right. The Bench fined the Company £2 2s., and ordered them to pay £3 8s. costs.

Fatality at Birmingham.—An inquest was held at Birmingham on Thursday concerning the death of Arthur George Edwards, a fitter's labourer, who died at the General Hospital on Nov. 18, as a result of a fracture of the base of the skull sustained at the Nechells Gas-Works on the previous Wednesday. George Brooks, a fitter at the works, who was in charge of a number of men, including Edwards, said that on the morning of Wednesday, the 14th inst., Edwards was sent to fetch an oilcan. He had to pass along a foot-plate, about 18 in. above a concrete floor. A few minutes later, Edwards was found on the floor unconscious. On the platform was a round piece of iron, on which, witness surmised, Edwards might have slipped. A verdict of "Accidental death" was returned.

Victorious Gas at Scarborough.—It is gratifying to learn that the competition for the better lighting of the sea front at Scarborough has ended in a victory for gas over electric light. The Council have adopted a scheme for the brilliant lighting of the sea front and the better lighting of the streets. A new system of 1200 c.p. high-power lamps is to be installed in preference to electric lighting. There will be festoons of electric strip lighting on certain parts of the sea front, but these will be more for decorative purposes than for illumination. On the South Foreshore there are to be 31 lamps of 1200 c.p., and on the Esplanade 40 similar lamps. These will be lighted throughout the year. On the Marine Drive there will be 47 of these lamps, lighted during the summer months only. It is also proposed to improve the lighting in a good many of the streets and roads. The increased lighting will cost another £2283 on the present annual charge for street lighting, which amounts to about £4100.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Dr. Davidson's Book on "Gas Manufacture."

SIR,—Through the politeness of Mr. C. M. Croft, the Chief Engineer of the Wandsworth Gas Company, I have come within the knowledge of Dr. W. B. Davidson's work on "Gas Manufacture."

Dr. Davidson's modesty appears to have kept the book out of the advertisement columns, for I had not previously heard of it; but I do wish to call the attention of all gas administrators, whether they be managers, engineers, accountants, or directors, to the value of this book, which is written in a thoroughly scientific, but modest and understandable, spirit, and leaves untouched no part of the conditions attaching to the production and distribution, as well as the best use of analysis, of gas.

I have not seen a book which attracted me more since the long-remote work of Samuel Clegg, which found its way to my bookshelves in the sixties. It is readable, practical, and most instructive, without being too repellent in abstract scientific annotations and calculations.

I do not usually indulge in much praise; and I am well aware that the gas industry has had some very portentous works presented to it—chiefly describing the plans of contractors. Dr. Davidson's book, however, defines the first principles, and clearly and logically develops them into useful shape to suit the purposes of all interested in the great business to which we belong. I make no apology for attracting the attention of all chairmen, and the whole of the staffs who are engaged in the promotion of our joint work, to the publication.

HY. E. JONES.

P.S.—I should like to add that Dr. Davidson is an entire stranger to me.

Palace Chambers, Westminster, S.W., Nov. 22, 1923.

Wrought-Iron Pipes for Internal Fittings.

SIR,—May I inquire through your columns what is the present-day attitude of distributing engineers to the usage of wrought-iron pipes for internal fittings?

We have experienced for a long time past the greatest difficulty in obtaining iron tubing for this purpose. In many cases the bundles have contained only a proportion, the remainder being steel. I do not believe there are two opinions as to which is better for the purpose, but users would appear either to have overlooked the point or to be under the impression they are receiving the better instead of the worse article.

Is not the matter one in which the Institution should interest itself, and draw up a standard specification of quality?

A. STOKES,
Gas Supply Manager.

South Metropolitan Gas Company,
709, Old Kent Road, S.E. 15,
Nov. 27, 1923.

Rubber Joints for Gas-Mains.

SIR,—As my business has largely had to do with piping and transmission through mains, I was greatly interested in Mr. Hole's article on the employment of rubber as jointing material for gas-mains.

Anyone who has had experience with gas-mains in a colliery area will know that a load of trouble could be avoided if the information in Mr. Hole's article could be acted upon. It seems clear that rubber of the right kind, properly vulcanized, makes a good and permanent jointing material. What I should like to know is whether such rubber can be bought to-day of the same quality as that mentioned by Mr. Hole, which apparently was available many years ago?

It would be of great service to myself and others if Mr. Hole would indicate the source from which he obtains the trustworthy rubber about which he writes.

H. LIVSEY.

Belle Vue, Stanley Park Road, Carshalton-on-the-Hill, Sutton, Nov. 26, 1923.

Results of the "Standard Requirement" Scheme at Batley.

SIR,—Nine months ago, a standard requirement system was adopted in Batley, on similar lines to the one introduced by Mr. M'Lusky at Halifax—*i.e.*, the gas to be charged for at the lighting rate is based on the size of the living and reception rooms of the dwelling-house, all gas used in excess of this figure being charged at a reduced rate.

The only difficulty encountered was that many old houses had large rooms; and this adversely affected the standard requirement figure compared with more modern houses. This has been overcome by treating all rooms above 150 sq. ft. as 150 sq. ft. (*i.e.*, a standard requirement of 6000 c.ft. gas consumption per annum).

The scheme has undoubtedly been a great success at Batley; and the sales of heating, cooking, and washing appliances have been more than doubled since the system was introduced. From the standpoint of undertakings such as Batley, where the installation of separate meters is out of the question, the overhead charges being high and the manufacturing costs low, and where an increased consumption is the only way of supplying cheaper gas, I am satisfied, even from my own short experience, that Mr. M'Lusky's scheme provides a satisfactory means to that end.

Batley experience may be summarized as follows:

1. The scheme is popular with consumers. The smaller charge for non-lighting, though at the present time only 6d. per 1000 c.ft., is undoubtedly a big inducement to the installation of heating, cooking, and washing appliances.
2. Expenditure on additional meters is avoided.

3. Since the introduction of the scheme, the sale of appliances has greatly increased. An enormous gas consumption must therefore result.
4. Consumers come under the scheme gradually, and not *en masse*. This allows of the satisfactory inauguration of the scheme.
5. Many consumers use their standard requirement of gas (*i.e.*, the amount of gas to be charged at the ordinary rate) during the summer period—viz., March 31 to Sept. 30—and therefore during the quarters ending Dec. 31 and March 31 are only charged at the lower rate for all gas, regardless of quantity. This in itself is an incentive to greater consumption. When the meter inspectors find that a consumer has used his standard requirement of gas, they immediately notify him of the fact, and remind him that all further gas used until March 31 will be charged at the cheaper rate.
6. There is undoubtedly slightly more work in connection with the gas accounts; but the benefit received is well worth the additional labour involved.
7. The extra work in measuring up the houses for which application has been made is small. In some cases the visit has resulted in the sale of new appliances; in others, in the replacement of faulty ones.
8. The question of supplying free to every consumer a good lighting burner or, alternatively, a boiling burner, is being considered at the present time.

It may be that we shall in course of time adopt the Halifax extension of the original scheme. Circumstances prevented me from attending the Manchester District meeting, otherwise I should have given the above observations at that meeting. The scheme is a step in the right direction. It is giving good results at Batley; and we are indebted to Mr. M'Lusky both for pioneering it, and for his readiness to give us the fullest information when we had it under consideration.

R. H. DUXBURY,
Engineer and Manager.

Gas Works, Batley, Nov. 20, 1923.

"Japan's Purgatory" and Drawing Materials.

The following further correspondence has taken place on the above subject.

Messrs. J. Halden & Co., Ltd.,
15 and 17, Broadway,
Westminster, S.W. 1.

DEAR SIRS,—I notice the publicity you have given to the correspondence which has taken place between us in respect to the article denouncing the use of gas in your publication entitled "The Arc."

Our "JOURNAL," rightly I think, calls for a disclaimer of the statement to which exception is taken, and in this we certainly support them.

We are therefore returning the two sample tapes sent to us; and when you have acted in accordance with their suggestion, we see no reason why we should not resume business relations with you.—Yours truly,

(Signed) J. URQUHART,
Managing Director.

Gas Offices, Dorking, Nov. 17, 1923.

J. Urquhart, Esq.,
Gas Offices, 91, High Street,
Dorking.

DEAR SIR,—In reply to your esteemed favour dated the 17th inst., addressed to our London House, which has been forwarded to us for attention, we desire to inform you that in the next issue of "The Arc," which will be published in January next, it is our intention to publish the recent correspondence arising out of the article under the heading "Japan's Purgatory" which appeared in our last issue. Our intention is to give the same publicity to this correspondence as was given to the article which has unfortunately given rise to this correspondence, and we hope in doing so that our position with our many friends in the gas trade will be made quite clear.—Yours faithfully,

Per pro J. HALDEN & CO., LTD.,
(Signed) J. B. HALDEN,
Director.

Manchester, Nov. 20, 1923.

[We still think there should be, on the part of Messrs. Halden & Co., complete retraction in the columns of "The Arc" of the offensive passages which gave rise to our comments and this correspondence. —ED. "G.J."]

Dublin Gas Worker's Compensation Claim.—The High Court of Appeal, Dublin, heard an appeal by the Alliance and Dublin Consumers' Gas Company from a decision of the Recorder of Dublin awarding to Thomas Kenny, stoker, a weekly sum of 6d. compensation for personal injuries while working at a furnace on the Company's premises, and directing the Company to pay Kenny £7 7s. costs, and £1 11s. 6d. for medical witness's expenses. Appellants asked to have the award set aside, on the grounds that notice of the accident was not given as soon as possible after its occurrence, and that no claim for compensation with respect to it had been made within six months from the date of occurrence. It appeared that, while the applicant was working at a furnace, a clinker fell into the water pan underneath, with the result that a splash of boiling water struck him in the eye, so injuring it that he permanently lost the sight of it. He informed the foreman and an expert of the Company (Mr. Conroy), and went on working as usual for a time. In evidence he admitted he had not made a claim within the time limit, but said he had given notice of the accident. The Court allowed the appeal, and set aside the Recorder's award, with costs, being of opinion that there was no evidence that the failure to make the claim was due to any reasonable cause

REGISTER OF PATENTS.

Prepayment Mechanism.—No. 205,596.

MCINTYRE, J., and MILNE, J., and SON, LTD., both of Edinburgh.

No. 20,539; July 27, 1922.

This invention relates to prepayment meters of the class which has a price-changing disc, and has for its object to improve the construction and security of such meters. At any desired point during the rotation of a hand-operated toothed wheel, this wheel is made to mesh with and rotate another toothed wheel by the combined action of a coin, one stationary cam, and one moving cam with projections.

Apparatus for Testing the Capacity of Meter Diaphragms, &c.—No. 205,695.

GLOVER, T., & CO., LTD., and GLOVER, W. R., both of Edmonton, N. 18.

No. 29,214; Oct. 26, 1922.

This invention relates to apparatus for testing the capacity of the diaphragms or bellows of a gas-meter by causing either of the actuating arms or a tangent or a stop or pin on the under spindle to establish an electric circuit on each complete revolution.

The apparatus has a valve controlling the supply of gas to the meter being tested, which valve is opened by hand and held over by means of a movable armature. The valve is closed by the movement of the armature attracted by a solenoid; the valve rod being released and assisted by a soft iron core which is also attracted by the solenoid. At the same time the electrical circuit is broken, and no interference is made with any other meter being tested from the same main gas-supply pipe.

Flow Meters.—No. 205,669.

ROGERS, F. H., of Queen Victoria Street, E.C. 4. (Communicated by the Republic Flow Meters Co., of Chicago.)

No. 27,285; Oct. 9, 1922.

This invention relates to flow meters of the type described by Mr. John Terrace in his paper on the "Electro Flow Meter" presented to the Southern Association last November [see "JOURNAL" for Dec. 6, 1922, p. 619]. The paper aroused much interest; and it is understood that the meter has since gained adoption by several undertakings. Accordingly we reproduce the specification at some length, pointing out that the invention obviates separate density corrections.

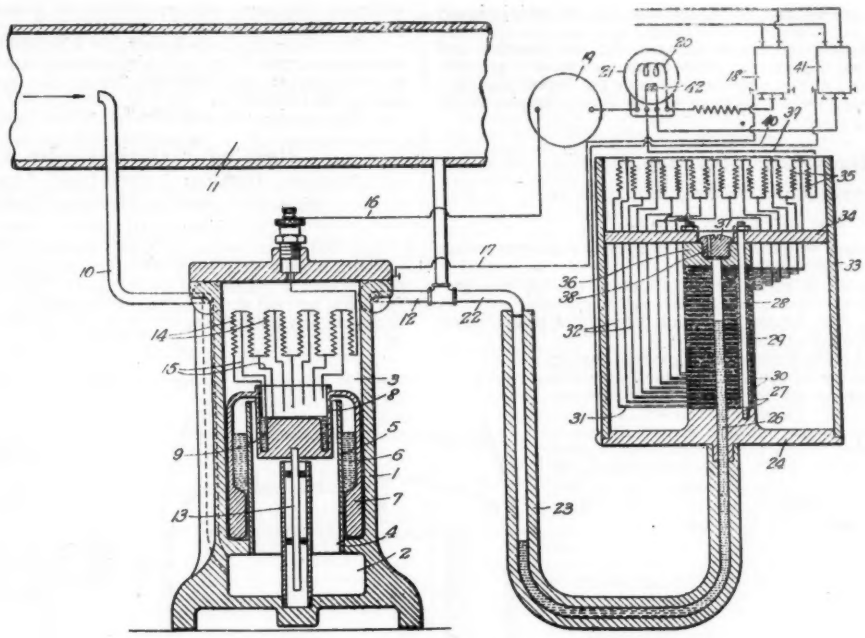
According to the invention, the flow meter has a second circuit arranged to vary the reading of the measuring instrument, and means controlled by the static pressure of the fluid for varying the current in the second electric circuit.

It is pointed out that meters which depend upon differential pressure for measuring the flow of a fluid are subject to error due to the variation in density of the fluid which arises from pressure and temperature difference. In all cases where flow meters are used for determining the quantity of fluid passing through a line, the differential pressure in the line as measured by a Pitot tube or other device is a function of the square of the velocity of the fluid in the line, and also of the density of the fluid at the given pressure; the quantity of fluid being a direct function of the velocity and also of the density. If the density were constant, an instrument arranged to indicate values proportional to the square root of the differential pressure would indicate values directly proportional to the quantity of fluid passing through the line, for the reason that the quantity is proportional to the square root of the differential pressure. Such an instrument must be corrected, however, for variations in density, and the present invention provides means for automatically making such corrections.

In the drawings, the numeral 1 designates the casing of a flow meter similar to that described and claimed in a co-pending application No. 205,670.* The interior of the casing is divided into a lower chamber 2 and an upper chamber 3 by a partition wall 4 and a tubular member 5. The member 5 forms an annular well 6 between its outer face and the inner face of the casing 1, which is partially filled with a liquid, such as mercury, in which a bell-shaped float 7 is suspended. The upper portion of the float 7 carries a cup 8 which contains a conducting liquid 9, such as mercury. The chamber 2 is subjected to dynamic pressure by a connection 10 leading to the pipe line 11 in which the flow of liquid is to be measured. The chamber 3 is subjected to a static pressure from the pipe line by a connection 12. Increase in pressure in the chamber 2 will cause the float 7 to rise in the annular well 6 by forcing downwardly the upper surface of the mercury in the float. A guide rod 13 is connected with the lower portion of the cup to guide it in its up and down movement. A series of resistance coils 14 is supported in the upper portion of the chamber 3 and is provided with contact wires 15 which extend into the cup 8. The ends of the wires 15 are arranged in a helical line so that, as the cup 8 is raised by the differential pressure, the ends of the contact wires will be successively immersed in the mercury 9. This will successively cut out the resistances 14 and decrease the total resistance in the circuit. Terminal wires 16 and 27 for the series of resistance coils 14 lead to a suitable source of electromotive force 18 of constant potential. The line wire 16 passes through an ammeter 19 and the current coil 20 of a recording wattmeter 21.

The resistance coils 14 are proportioned so that the current flowing in the line 16 will be proportional to the square root of the differential pressure in the line 11. This will cause the reading of the ammeter 19 and recording wattmeter 21 to indicate directly the quantity of fluid flowing in the line 11—so long as the density of the fluid remains con-

* Notice of this is omitted from our "Register," as the principle is clear from Mr. Terrace's description of the instrument and from No. 205,669.



The "Republic" Flow Meter.

stant. Increase in the density will produce a proportional increase in the quantity of fluid in the pipeline, and also a proportional increase in the differential pressure to which the flow meter is subjected; but since the readings of the instruments 19 and 20 are proportional to the square root of the differential pressure, the increase in the readings for an increase in density will not be sufficient to indicate properly the increase in the quantity of fluid flowing in the line.

In order to compensate for this deficiency, a second instrument (shown at the right of the figure) is connected to the pipeline 11 by a pipe 22 so as to be subjected to the static pressure in the pipeline. The pipe 22 connects with a U-tube 23 secured to the lower face of a baseplate 24 of this second instrument, the interior of the U-tube being arranged to communicate with an opening 26 in the baseplate 24. Discs of conducting material 27 are supported on the upper face of the baseplate 24 and held in position by rods 28 passing through perforations in the discs and insulated therefrom by a tube 29. The conductor discs 27 alternate with insulator discs 30; and the discs 27 and 30 are provided with registering central perforations. Each conductor disc 27 is provided with a laterally extending arm 31, the arms being offset angularly relative to one another; and each arm is connected to a lead wire 32. A series of resistance coils 35 is located in the space above the plate 34, and the lead wires 32 are connected to the circuit of the resistance coils at intermediate points between the coils. The block 36 should permit communication between the opening 26 and the atmosphere; and this may be done by means of a small perforation 38. The resistance coils 35 are connected by lines 39 and 40 with a suitable source of constant electro-motive force 41, and the connecting line 39 passes through the pressure coil 42 of the recording wattmeter 21.

As the pressure increases in the U-tube 23 the mercury will be caused to rise in the tube 26 so that it will make contact with an increasing number of the conducting discs 27. This will successively short circuit the resistance coils 35, and decrease the resistance in the circuit of the pressure side of the recording wattmeter 21. This will cause an increased flow of current in the pressure coil 42 of the wattmeter, correspondingly increasing the reading of the instrument. It will thus be seen that as the pressure in the line 11 increases, the reading of the wattmeter 21 will be correspondingly increased; and, since the density of the fluid in the pipeline is a direct function of the pressure so long as the temperature is constant, the error of the flow meter arising from change in density may thus be corrected by a properly calibrated compensator of the kind described.

A modified form of compensator is also described.

Carbonizing Coal.—No. 186,927.

STÉ. LYONNAISE DES EAUX ET DE L'ECLAIRAGE, of Paris.

No. 26,833; Oct. 4, 1922. Convention date, Oct. 7, 1921.

This carbonization process is characterized by the combination of the following features:

1. The continuous introduction of the coal in a very finely divided state, into chambers heated to redness.

2. A simultaneous injection of hydrogen or hydrogen-containing gas in such a manner as to maintain in the atmosphere of the chamber a permanent partial tension of hydrogen greater than that which should result from the dissociation of the hydrocarbon elements contained in the coal, or which are given off during the heat treatment of the same.

3. The discharge of the gases produced through this protecting atmosphere.

4. The adjustment of the atmosphere and of the delivery of the protection gas in such a manner as successively to help the hydrogenation of the non-saturated hydrocarbons, then their decomposition into carburetted gases in an excess of hydrogen, and finally a direct combination of a portion of the residual carbon with the excess of hydrogen.

5. The leaving of the residual carbon of the elements which are necessary for its agglomeration in the form of marketable coke.

The major part of the gasifying is effected in a fraction of a second, and it is rapidly completed upon the surfaces of the walls and of the mass of coke in formation. The temperature of the protective gas progressively increases so as to act as described above; and the gas obtained is directly discharged, without being filtered, through a layer of coke heated to redness. But the fineness of the particles, and the speed, length, output, and force of the stream of coal powder are regulated so that the residual particles, upon contact of the same with the red hot walls of the chamber or with the already formed coke, will retain the binding parts necessary for agglomeration, which is assisted by the compression due to the impact.

It is pointed out that the hydrogen or hydrogen-containing gas can be produced in the chambers or retorts themselves, when these become filled with red-hot coke at the end of the treatment, and the resulting gas may be injected into the other retorts wherein the treatment is taking place; or the gas can be produced by special generators.

A form of plant is also claimed.

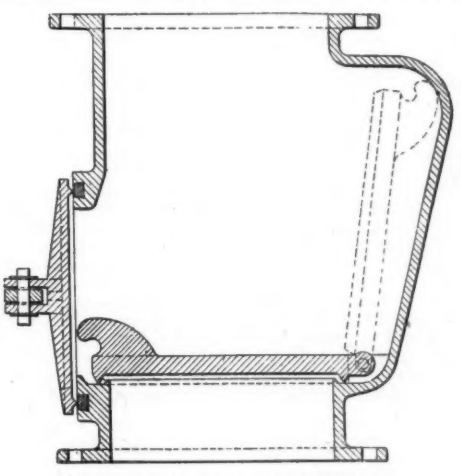
Gas Off-Take Pipes of Vertical Retorts.—No. 205,400.

WEST, F. J. & E., and WEST'S GAS IMPROVEMENT CO., LTD., all of Manchester.

No. 34,169; Dec. 14, 1922.

This invention, relating to the off-take pipes of vertical retorts, seeks to obviate certain difficulties of previous arrangements.

The gas off-take or ascension pipe is made in two parts with a valve fitting [shown in the accompanying side elevation] between. The



Improved Off-Take for Vertical Retorts.

valve fitting contains a hinged valve which, when fully open, rests clear of the throughway passage, so as to offer no obstruction to the free flow of gas. Its seating surface may consist of a knife-edge which rests in a shallow bath round the inlet passage. Tar or pitch tends to accumulate in this bath, and is maintained in a plastic state so that it forms an effective sealing medium for the valve, and a protection for the actual seating surfaces. When, therefore, the valve is closed, and

the retort is being scurfed, the seating surfaces will not be injuriously affected.

The inspection door is of a size sufficient for the insertion and removal of the valve, if required. The valve may have a grip-like part by which it can be readily opened through the inspection door. The latter serves also for the passage of the augers employed for cleaning the off-take pipes.

Gas-Fires.—No. 205,567.

CARPENTER, C., of Old Kent Road, S.E. 15.

No. 19,753; July 18, 1922.

This invention relates to gas-fires, and more particularly to means for heating the combustible mixture.

A gas nozzle, adapted to inject air, is located at the top of a gas-fire, and so arranged as to drive the air through a chamber which is heated by the products of combustion; and the mixture passes down the side or back of the fire to the burner.

The air may be led to the chamber by a passage having an inlet near the bottom of the fire, in which case the rising current of incoming air helps to force the mixture in a downward direction towards the burners, with the result that the gas nozzle has but little extra work to do. Preferably the products of combustion have direct access to that part of the chamber which passes along the top of the fire, this part of the chamber comprising an air-heating box provided internally with baffles. The chamber may also be provided with gills or fins.

Fig 1

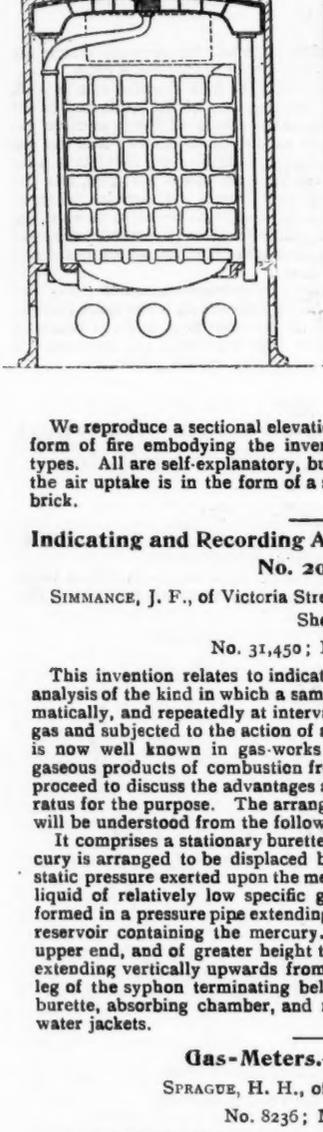


Fig 2

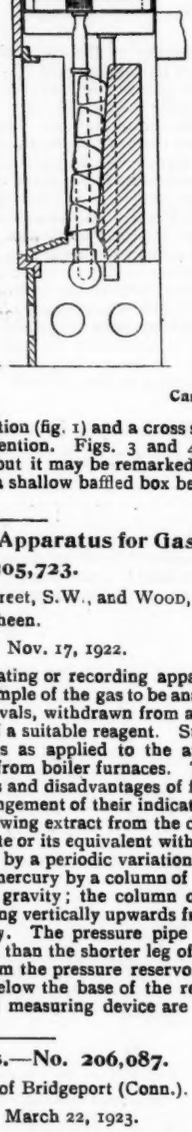


Fig. 3.

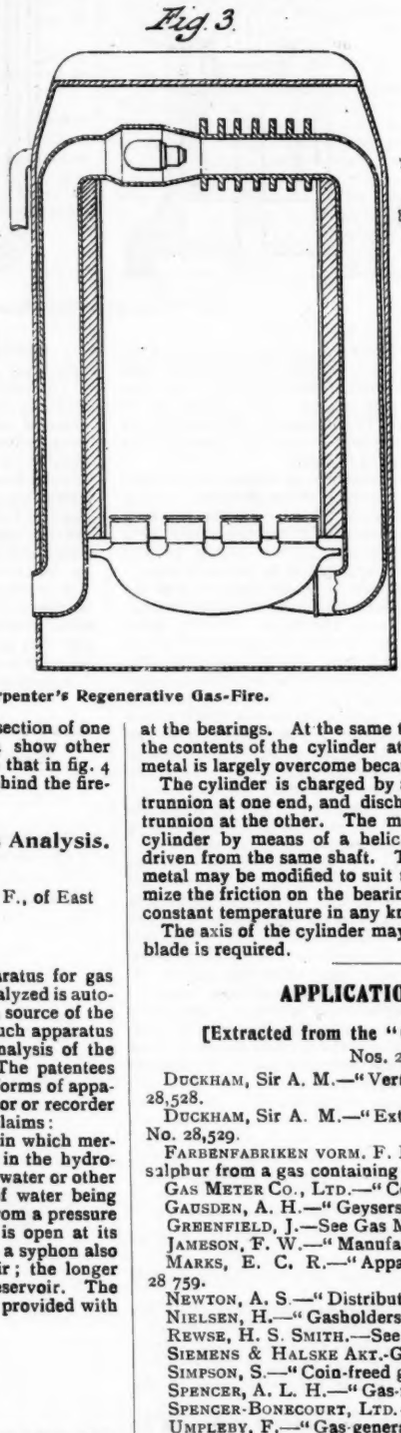
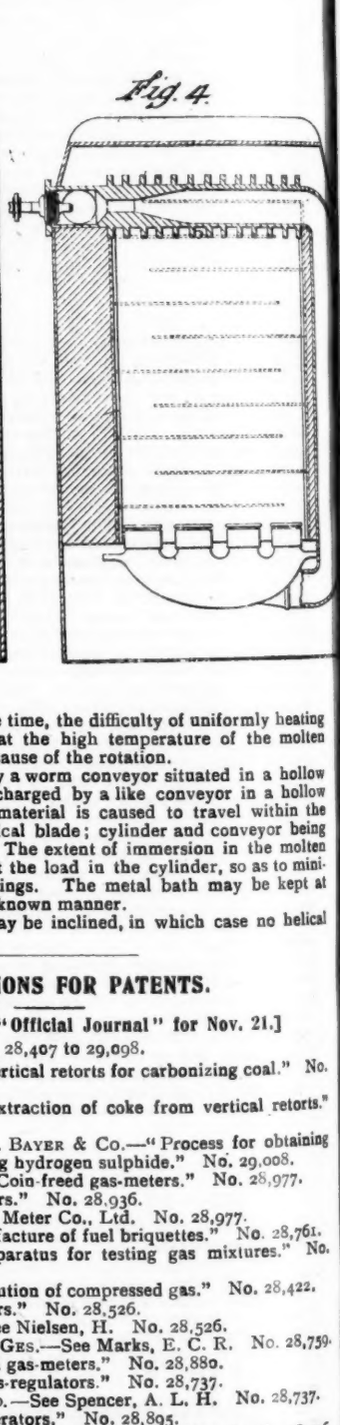


Fig. 4.



Carpenter's Regenerative Gas-Fire.

We reproduce a sectional elevation (fig. 1) and a cross section of one form of fire embodying the invention. Figs. 3 and 4 show other types. All are self-explanatory, but it may be remarked that in fig. 4 the air uptake is in the form of a shallow baffled box behind the fire-brick.

Indicating and Recording Apparatus for Gas Analysis. No. 205,723.

SIMMANCE, J. F., of Victoria Street, S.W., and WOOD, F., of East Sheen.

No. 31,450; Nov. 17, 1922.

This invention relates to indicating or recording apparatus for gas analysis of the kind in which a sample of the gas to be analyzed is automatically, and repeatedly at intervals, withdrawn from a source of the gas and subjected to the action of a suitable reagent. Such apparatus is now well known in gas-works as applied to the analysis of the gaseous products of combustion from boiler furnaces. The patentees proceed to discuss the advantages and disadvantages of forms of apparatus for the purpose. The arrangement of their indicator or recorder will be understood from the following extract from the claims:

It comprises a stationary burette or its equivalent within which mercury is arranged to be displaced by a periodic variation in the hydrostatic pressure exerted upon the mercury by a column of water or other liquid of relatively low specific gravity; the column of water being formed in a pressure pipe extending vertically upwards from a pressure reservoir containing the mercury. The pressure pipe is open at its upper end, and of greater height than the shorter leg of a syphon also extending vertically upwards from the pressure reservoir; the longer leg of the syphon terminating below the base of the reservoir. The burette, absorbing chamber, and measuring device are provided with water jackets.

Gas-Meters.—No. 206,087.

SPRAGUE, H. H., of Bridgeport (Conn.).

No. 8236; March 22, 1923.

In a gas-meter according to this invention, the patentee states that, by isolating in a special manner the worm and worm gear of the recording mechanism, he combines the advantages without the disadvantages of the "open top" and "closed top."

He claims:

1. A gas-meter having worm and worm gear for the recording mechanism within the gas distributing chamber, and a housing therein enclosing the worm and worm gear, to protect them against the injurious effects of the gas.

2. The mounting of the housing on a bracket secured to the side of the chamber, and filling it with an oleaginous substance to serve both as a lubricant for the worm and worm gear and also as a repellant against gas impurities.

3. The construction described in the specification.

Heating Materials.—No. 205,006.

WOODALL, DUCKHAM, & JONES (1920), LTD., and DUCKHAM, Sir A. M'D., both of Grosvenor Gardens, S.W. 1.

No. 20,723; July 28, 1922.

This invention relates to heat treatment in a rotating cylinder, which is more or less immersed in molten metal, such as lead or lead alloy heated to the desired temperature. The high specific gravity of the metal permits the weight of the cylinder to be counter-balanced to almost any desired degree, thus greatly reducing frictional losses at the bearings. At the same time, the difficulty of uniformly heating the contents of the cylinder at the high temperature of the molten metal is largely overcome because of the rotation.

The cylinder is charged by a worm conveyor situated in a hollow trunnion at one end, and discharged by a like conveyor in a hollow trunnion at the other. The material is caused to travel within the cylinder by means of a helical blade; cylinder and conveyor being driven from the same shaft. The extent of immersion in the molten metal may be modified to suit the load in the cylinder, so as to minimize the friction on the bearings. The metal bath may be kept at constant temperature in any known manner.

The axis of the cylinder may be inclined, in which case no helical blade is required.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Nov. 21.]

Nos. 28,407 to 29,098.

DUCKHAM, Sir A. M.—"Vertical retorts for carbonizing coal." No. 28,528.

DUCKHAM, Sir A. M.—"Extraction of coke from vertical retorts." No. 28,529.

FARBENFABRIKEN VORM. F. BAYER & CO.—"Process for obtaining sulphur from a gas containing hydrogen sulphide." No. 29,008.

GAS METER CO., LTD.—"Coin-freed gas-meters." No. 28,977.

GAUSDEN, A. H.—"Geysers." No. 28,936.

GREENFIELD, J.—See Gas Meter Co., Ltd. No. 28,977.

JAMESON, F. W.—"Manufacture of fuel briquettes." No. 28,761.

MARKS, E. C. R.—"Apparatus for testing gas mixtures." No. 28,759.

NEWTON, A. S.—"Distribution of compressed gas." No. 28,422.

NIELSEN, H.—"Gasholders." No. 28,526.

REWSE, H. S. SMITH.—See Nielsen, H. No. 28,526.

SIEMENS & HALSKE AKT.-GES.—See Marks, E. C. R. No. 28,759.

SIMPSON, S.—"Coin-freed gas-meters." No. 28,880.

SPENCER, A. L. H.—"Gas-regulators." No. 28,737.

SPENCER-BONECOURT, LTD.—See Spencer, A. L. H. No. 28,737.

UMPLEBY, F.—"Gas-generators." No. 28,895.

WESTWOOD, W. W. S.—"Framework for gasholders." No. 28,556.

WESTWOOD AND WRIGHTS.—See Westwood, W. W. S. No. 28,556.

WOODALL, DUCKHAM, AND JONES (1920), LTD.—See Duckham, Sir A. M. No. 28,528.

WOODALL, DUCKHAM, AND JONES (1920), LTD.—See Duckham, Sir A. M. No. 28,529.

WRIGHT, J. C.—"Vertical retorts." No. 28,857.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

The Twenty-Sixth Annual General Meeting of the Association was held last Thursday, at Caxton Hall, Caxton Street, Westminster, under the chairmanship of Dr. CHARLES CARPENTER. The register of attendance showed that the membership was represented on the occasion by the following gentlemen: Messrs. R. W. Edwards (Aldershot, Vice-Chairman), George Stevenson (Long Eaton), W. F. Whittaker (Grays and Tilbury), James L. Garrard (Eastbourne), E. J. K. Fussell (Tottenham), W. W. Townsend (Colchester), D. H. Helps (Reading), George Clarry (Cardiff), R. Bruce Anderson (City of Waterford), G. W. Anderson (Dover), H. A. Stibbs (Portsea Island), William Phillips (Luton), W. H. Johns (Swansea), A. A. Johnston (Brentford), Ralph Halkett (Sheffield), and C. M. D. Belton (Shrewsbury).

The SECRETARY (Mr. F. E. Cooper) read the notice convening the meeting, and also the minutes of the last meeting, which latter were duly confirmed. He also mentioned that letters regretting inability to attend had been received from various members.

ANNUAL REPORT.

The annual report of the Committee was as follows:

The Committee herewith present the revenue account and balance-sheet, together with a report of the proceedings of the Association for the year ended Sept. 30, 1923.

The ascertained expenditure amounted to £494 6s. 4d. The revenue was: Subscriptions, £450 19s. 6d.; interest on War Loan, £72 10s.; amounting together to £523 9s. 6d.; leaving a surplus for the year of £29 3s. 2d. From the balance-sheet it will be seen that the assets amount to £1642 7s. 4d., consisting of £1450 5 p.ct. War Loan, 1929–1947, at cost, £1377 10s. (the value of which at the date of this report is £1488 19s. 4d.); balance at bank, £259 10s. 5d.; and cash in hand, £5 6s. 11d.

The most important matter dealt with by the Committee was in connection with the appointment of the Departmental Committee by the Board of Trade to inquire and report as to the method of charging for gas on a thermal basis. Realizing the misapprehension upon the question existing in the public mind, the Committee considered it their duty to give the Departmental Committee the fullest assistance possible, in the belief that the outcome of such inquiry would be stabilized conditions for the gas industry, which, after years of disturbing influences, it was entitled to expect would follow the passing of the Gas Regulation Act, 1920. The Parliamentary Agents for the Association were instructed to watch the proceedings before the Departmental Committee, and the Chairman and Vice-Chairman gave evidence on behalf of the Association before the said Committee. On Feb. 19, 1923, the Departmental Committee presented to the Board of Trade their report, in which they expressed themselves as being unanimously of opinion that the method of charging for gas on the basis of its heating properties—*i.e.*, by the therm—is the best safeguard of the consumer.

The Executive Committee considered the recommendations of the Departmental Committee as to the information which should be furnished to the consumers of gas, on meter cards, invoices, and prepayment receipts, and the suggestion as to the regular changing of consumers' meters (in paragraph 60 of the said report). The Chairman was requested, as the Association's representative, to attend the conference convened by the Board of Trade to discuss the said recommendations, with a view to their modification. The Chairman and Secretary of the Association attended the conference, when the Board of Trade proposed that, in the case of companies who do not supply the detailed meter-card referred to in Recommendation 2 (*a*) of the said report, a notification should be issued to each consumer that such meter-card will be furnished to him on his request. In addition to this, Recommendation 2 (*b*) was also slightly amended in the interest of prepayment meter consumers. A circular letter, recommending the proposals of the Board of Trade to the careful notice of gas companies, was issued to members of the Association.

The course to be adopted by the Association with regard to the proposed gas exhibit at the British Empire Exhibition, 1924, was considered, and the Chairman was appointed as the Association's representative on the Committee formed to arrange the planning and carrying out of the exhibit.

The Committee passed a resolution in support of the Gas Exhibition at Birmingham, and at their request the Chairman consented to become a Vice-President of the Exhibition.

The conclusions arrived at at the conference with the Board of Trade, as to inspection of gas mains, fittings, &c., were duly considered by the Committee, and amended by them.

The Executive Committee considered the South Staffordshire Mond Gas Bill, which, as deposited in Parliament, would enable the promoters to supply gas for illuminating purposes in competition with existing authorized gas undertakings. The Parliamentary Agents for the Association took the matter up with the promoters, and ultimately certain amendments were made in the Bill so as to provide that the Company should not supply Mond gas for private illuminating purposes.

Other Bills which the Committee considered, and instructed the Secretary to keep under observation, were the Unemployment Insurance Bill, the Workmen's Compensation Bill, and the Co-partnership Bill, introduced, with other Members, by Mr. Peto, to whom the Secretary was instructed to write expressing the Association's general approval of the principle of the Bill.

The position of statutory companies in relation to the obtaining of powers to supply electricity was considered, and it was decided that the Association should, without incurring any financial liability, give its sympathetic support to a Bill which Messrs. R. W. Cooper and Sons had drafted to overcome the difficulties which stood in the way of statutory gas companies in obtaining electrical powers. It is understood that the Board of Trade and the Electricity Commissioners are favourably disposed towards the Bill, which it is hoped will be introduced in the next session of Parliament as a Private Member's Bill, if the Government will not deal with the matter.

Among matters of minor importance that have been considered by the Committee and the Sub-Committees during the past year are: Amendment of Superannuation Fund (Rules); loss of profits insurance; London and Home Counties Electricity District Order; loss occasioned by destruction of meter by fire on consumer's premises; cost of gas in Ireland; and the Commission on Prices.

The Income-Tax Sub-Committee have had various matters under consideration, including the assessment of the Association for income-tax; rate of tax deducted from dividend paid in part out of reserved fund; payment of income-tax on a house provided by a company for their manager; and question of disallowance by a Local Inspector of Taxes of a claim made by gas company to charge to revenue for income-tax purposes costs and damages incurred by them in consequence of an accident arising from a gas explosion. As regards the last-mentioned matter, the Company concerned followed the Sub-Committee's advice, with satisfactory results. The Income-Tax Sub-Committee now consists of the following members: Mr. Charles F. Botley (Chairman), Mr. G. W. Anderson, Mr. Frank Day, Mr. E. J. K. Fussell, and Mr. William F. Whittaker.

In response to a request received in October, 1922, from the British Engineering Standards Association, requesting the Association to nominate a representative to serve on the Sub-Committee of that Association appointed to revise the British Standards Specification for cast-iron pipes for water, gas, and sewage, Mr. J. Ferguson Bell, M.Inst.C.E., was asked, and consented, to serve as such representative.

The Committee have to record with great regret the death of their esteemed colleague, Mr. George Andrews, Deputy-Chairman of the Swansea Gas Light Company, who in 1909 was appointed a member of the Committee, in succession to his father, the late Mr. Thornton Andrews, one of the founders of the Association.

As in former years, the Secretary has had considerable correspondence with members on many of the matters dealt with by the Committee and Sub-Committees, in addition to advising them on many subjects, including the following: Public street lighting contracts and specifications; income-tax; depreciation; distraint on gas-apparatus supplied on hire purchase; income-tax on directors' fees paid tax-free; superannuation fund; loss of profits; fire insurance; liability for accidents after re-instatement of road broken up; officers' superannuation; limitation of amount carried forward; inspection of gas mains and fittings; right of company to remove meters, stoves, &c., where gas not consumed; sale of superfluous land and buildings; depth of main laying, steam roller clause; voting at meetings by proxy; transmission of shares by death; rate of income-tax payable on dividend paid wholly or in part out of reserve fund; alteration of level of road; appearance on behalf of company in County Court; interference with gas-apparatus by electricity supply company; laying of gas main by local authority outside its limits of supply; pension fund; laying of gas main in proximity to water main; liability for meter on consumer's premises destroyed by fire; liability of consumer to pay for gas where money stolen from prepayment meter; cutting off gas supply after notice of discontinuance received.

The following members retire from the Committee in accordance with Rule 12: Dr. Charles Carpenter, C.B.E. (Chairman), Mr. J. Ferguson Bell, Mr. Charles F. Botley, Mr. A. A. Johnston, Mr. H. E. Jones, and Mr. H. A. Stibbs, all of whom offer themselves for re-election.

MUCH WORK FOR LITTLE MONEY

The CHAIRMAN, on rising to move the adoption of the report and accounts for the year, said, with regard to the latter, it was clear that, for the comparatively small sum set out, they had been able to carry through a great deal of work which was of much use and importance to the gas industry. With regard to the amount shown for subscriptions outstanding, most of this had since been collected, and there was only about £19 still to come in. The only other thing he need say about the finances was that perhaps the members would have noticed that the costs of the Therm Committee were exceedingly small. An enormous amount of work was done, and a great deal of information obtained from various members by Mr. Cooper and his brother, and the total cost thereof came within about £120. Having regard to the great importance of the matter, this was a very satisfactory figure. ["Hear, hear."]

THE THERM INQUIRY.

As to the report of the Committee, as far as possible this dealt with the activities of the Association during the preceding twelve months; and, as was to be expected, the greatest stress had been laid upon the work done by the Committee in regard to the inquiry by the Board of Trade on the Thermal System. That work and that inquiry, he thought, brought home to all of them the fact that they had got to keep their powder dry and their ammunition in good condition, because apparently they would never know when some mushroom agitation such as that one—perhaps he might so term it, though it was on the scale of a whirlwind—might be sprung upon them, and so they must have the machinery always ready to deal with it. Really it seemed to him essential that the gas undertakings should, for the protection of their interests, maintain an organization that was at all times prepared to take up matters of this kind. In the last 26 years, the Association had very efficiently dealt with subjects which, in their way, were perhaps not less important than that pertaining to the therm system, and from time to time they had reaped, and in many cases were still reaping, the benefit of work done by the Association. Much of it formed a bridge, as Mr. Harry Jones had called it, for the conditions relating to gas supply to-day. It was not mentioned in the report, but it was a fact, that the Committee took the members into their confidence, and asked information from them with regard to various points in connection with the therm inquiry. The information so furnished was exceedingly useful, and strengthened the case they were able to put before the Departmental Committee of the Board of Trade. When he said "they," he had in mind two things—first, the fact that the information and proofs were very largely drawn up in Mr. Cooper's office; and, secondly, the fact that he (Dr. Carpenter) was able, supported by the Vice-Chairman, to give evidence before the Committee. What particular part all this played in inducing the Committee to arrive at the decision they did, it was impossible to say; but, at any rate, they might congratulate themselves that the Committee did unanimously come to the conclusion that the therm system was the right one. ["Hear, hear."] As gas undertakers, they must not forget that the object of the therm system was to give them—he was going to say their final charter. They could not say, of course, that there was finality pertaining to anything; but the object was to put them in a position of the greatest possible freedom, without being hampered in any way with regard to the choice of methods which they might adopt for the production of town's gas. The importance of this could not possibly be over-rated; and although at the present time it might look as if it was only a matter of twelve pence for a shilling, it was really something more than that, because they were not going to assume that the last word had been said with regard to the production of illuminating gas. A great deal of experimental work was in progress; and he would be a very bold man who would put forward the suggestion that the present system was the one which would continue. The therm system had given them per-

fect freedom to follow up, in any way that might from time to time be necessary, the best methods for producing that all-essential article of modern life—a good supply of gas for lighting, heating, and cooking. Then there were sundry small things which were really matters of detail that did not affect the question to a very great extent. They perhaps would have done so had the original ideas been carried out, because they would have saddled the gas undertakings with a great amount of trouble in regard to matters which were, to his mind, very much better left to the companies themselves to work out, so as to find what was the proper course to adopt. For one thing, there was the suggested compulsory changing of meters. He thought it would be very unfortunate if there were any cast-iron rules laid down to ensure the changing of all the meters on a district at certain fixed intervals. It was necessary to protect the consumers and the undertakings themselves; and this was done by examining the meters from time to time. This could be done, as the undertakings did it, at comparatively small expense; but it would have been very different had the obligation been placed upon them of replacing at stated intervals the whole of the meters in any district. Then there was an obligation with which none of them could find fault—that was, with reference to the meter card furnishing certain information to the consumer.

NEED FOR EDUCATING THE CONSUMER.

Of course, they all knew that not one consumer in a thousand ever read his meter card, though there was an intelligent minority who did do so. The latter group were a very valuable asset to the gas undertakings, because they used gas intelligently, and knew the why and the wherefor of the various methods. Some of them had very clear ideas about the consumption of gas through different apparatus; and gas administrators ought not to shut their eyes to the fact that to a certain extent these people acted as propagandists in bringing home to others the importance of gas. But, on the other hand, they did not want, for the sake of these few, to be saddled with the necessity for supplying a whole lot of details which would mean the provision of a great many sacks of waste paper in the course of the year. The gas companies' honour had come through the whole of the therm discussion absolutely clean. The worst that could be said was that some of them had perhaps been a little bit injudicious in the methods adopted to bring home to the consumers the new conditions. It was not, however, easy, when one thoroughly understood a subject, to assume complete ignorance on the part of other people; and some gas undertakings imagined the consumer understood more of the teaching in this matter than had really been the case. The report reminded them that they had been asked as an Association to give their support to the exhibition that was held recently in Birmingham, for the purpose of impressing upon the people—especially in the Midlands—the latest methods of using gas. There was no doubt that their action in this matter was the right one, though it was not attended with very great responsibilities. From time to time these exhibitions were arranged, and the Association had to take their share in the burdens attaching to them. It was curious how much ignorance on the subject of gas supply seemed to exist even to-day. Early in the present year, a gentleman called upon him to endeavour to interest the Company financially in certain proposals; and after the matter had been discussed, the visitor said: "I am a member of a gas committee myself." He (Dr. Carpenter) remarked: "That is most interesting, and, of course, you know all about gas." After a little further talk, the visitor said: "You surprise me. I had no idea that gas was used for anything else than cooking." [Laughter.] He mentioned this because it proved what he had been saying, that it was very important that they should not disregard their business of teaching the public that there were more uses for gas than many of them imagined. He had lately tried to bring this point out in a paper which he read before the Institution of Gas Engineers; and he would remind them now that there were matters in this paper which it was to their interest to bear in mind—namely, in reference to the large lighting load that existed in London.

THE LIGHTING LOAD AND THE GAS COMPANIES' OPPORTUNITY.

He knew in some quarters it was believed either that the lighting load was unimportant, or that it was not possible to retain it. This was not, he was sure, the opinion of those present, and it certainly was not his own experience. He believed, as a matter of fact, that one could sell anything, if one only laid himself out to sell it. It did seem unfortunate that there should be—if such really was the case—any feeling on the part of the gas industry that such an important part of their business as gas lighting could not be made remunerative. Let them imagine for a moment what an enormously favourable position a gas undertaking was in. In most cases the undertaking had a supply in practically every house, and in the ordinary course of business a call was made every quarter or perhaps every six weeks. Think what a valuable asset this was in the hands of a person who had anything to sell. What would Selfridge's, for instance, give for such an opportunity?

THE BRITISH EMPIRE EXHIBITION—AN APPEAL.

Now he wanted to say a word or two about the British Empire Exhibition that was being arranged for next year down at Wembley. This exhibition was now in course of construction, and the like of it had certainly not been seen in this country before. In important respects it was well forward, and it was quite possible that by next May leeway would have been made up in every direction. It would be a wonderful exhibition. There were a great many acres of ground under roof, and at the present time available for the exhibitors to get to work with the fitting-up of their goods or apparatus. He was very glad to say that the gas industry had realized its obligations in a matter of this kind, and the result had been that, in one sense, he might say a considerable amount of space, but relatively to the exhibition as a whole a very small amount, had been taken for a display in the interests of gas undertakings. He believed that the rental for the ground alone was something between £6000 and £7000. The exhibit would require a good deal of decorative work to be put in, for it must be made attractive to the hundreds and thousands of people who must go to Wembley, if the visits of the public were to be on the scale of the exhibition itself. It would be necessary, therefore, to spend a good deal of money on making a display worthy of its object. Even then, he was afraid it would be on a very small scale compared with that of their great opponent, whose possibilities of display were greater than those of gas. There had, however, been provided the beginnings of a satisfactory exhibit; and he did not think he would be revealing any secrets if he told them something of what was in the minds of the Committee in this matter. It would, of course, be possible to display stacks of cast-iron pipes and joints of different kinds, or one might have retorts or firebricks in pyramids, or models of gas appliances, stoking machinery, and all sorts of things, which from one point of view would be of some interest to a certain section of the public; but the Committee, he thought, had taken another course, and a very wise one. They had said: "Here is an exhibition which will be visited by consumers of gas from all parts of the kingdom. We want to bring something here which will be of interest to them, not in the abstract, as the question of retort furnaces or gas-making apparatus would be, but as pertaining to their homes, for lighting, heating, cooking, and the domestic uses of gas generally; also industrial gas processes, which were of a manifold nature, and were contributing in a great degree to the gas consumption of to-day. This was the basic idea at the back of the Committee's mind. Two London Companies had at the present moment, between them, put up £15,000 as a nucleus for going on with the work; and it was proposed shortly to send out two appeals. One appeal would go to the makers of gas apparatus, who were certainly interested in the progress of the gas industry. He thought it was perfectly legitimate to expect the makers to contribute liberally towards this expense. The other appeal would be made to gas undertakings. The amount which it was estimated would be required was something in the region of £80,000. Well, £80,000 would take a good deal of getting. When the circular letter went out, therefore, he did hope they would do all they could to contribute substantially to the expenses, which, as he had said, were bound to be very heavy, having regard to the circumstances of the case. It would have been unthinkable that gas should be left out of a British Empire Exhibition. There was a very good Committee at work; and anything the members of the Association could do to help forward the matter of finance, or in any other way, he was sure they would find it to their advantage to do.

SOUTH STAFFORDSHIRE MOND GAS BILL.

With regard to the South Staffordshire Mond Gas Bill, he might point out that, as a result of the action of the Committee, there was a restriction placed upon the undertaking that they should not supply Mond gas for private illuminating purposes. This was really as much as the Association could expect. They could not look forward to having an absolute monopoly in the matter of gas supply, as they had had in the past, and it was no use their attempting to secure it. They would not, in fact, wish to shut down such an important scheme as the Mond gas undertaking. It was necessary to accept it, and make the best of it. The gas industry would find they had plenty of work to do, quite apart from the customers that such an undertaking might supply. The Committee had considered other Bills, and the Secretary had dealt with them as occasion required.

GAS COMPANIES AND THE SUPPLY OF ELECTRICITY.

The position of statutory gas companies in relation to the supply of electricity was another matter that had been under the purview of the Committee; and what they decided was that, without undertaking any financial liability, they would give their sympathetic support to the proposed Bill which had been drafted to overcome certain difficulties which stood in the way of statutory gas companies obtaining electrical powers. It was, of course, no use looking back, and speculating upon what one might have done; but he supposed that, if they had an opportunity of being to-day in the position they occupied thirty or forty years ago, they would do things differently, with regard to the supply of electricity at any rate. Whatever might be the outcome, he was perfectly certain that if one set out to ascertain what were the ideal conditions for supplying energy for light, heat, and power, one would say the supply should be in the hands of one properly regulated undertaking; and they had had experience now extending over many years that it was quite possible satisfactorily to regulate what on first sight might seem a very great monopoly—namely, the gas undertakings. He always thought they were a particularly good example of how other monopolists could be regulated with, on the whole, great satisfaction to the public at large.

INCOME-TAX SUB-COMMITTEE.

The report recorded sundry other matters which had been considered by the Committee. He did not think he need refer in detail to these; but, in passing, he must pay a tribute to the Income-Tax Sub-Committee, which was an admirable one. The work the members of that Committee did was exceedingly valuable; and, with Mr. Cooper's help, this phase of the Association's activities did provide aid which was exceedingly useful—especially in the case of some of the smaller companies, or those situated in somewhat out of the way places.

STANDARDIZATION WORK.

The report also noted that the British Engineering Standards Association had asked their Association to nominate a representative to serve on the Sub-Committee appointed to revise the British Standards specification for cast-iron pipes. It was not necessary for him to say much with regard to the British Engineering Standards Association, the usefulness of whose work had been quite beyond what was hoped for at the time of the initiation of the Association. Gas undertakings should do all they could to encourage the standardization of the apparatus and appliances which they used, because it was obvious that the more this was done the wider would be the market from which they could buy, and the lower the cost was bound to be in the long run. Years ago there were proposals for standardizing the sizes and shapes of retorts; but his impression was that even to-day there were no such things as standard retorts. There were many standards in use all over the country, which could not be necessary. But, however the case might be with regard to retorts, it was certainly true in the matter of pipes and mains that there should be unanimity of

practice. He was sure Mr. Ferguson Bell's work on that Committee would be very valuable to gas undertakings as a whole.

THE MAINSPRING OF THE ORGANIZATION.

The report also recorded the fact that, as in previous years, the Secretary had had considerable correspondence with different members, who wrote to him on all sorts of subjects. One of Mr. Cooper's functions was to reply to these inquiries; and it must be very helpful to many of the subscribers to find that, by addressing a letter to headquarters, they could obtain reliable information on very varied matters. And all this was done for something like £450 a year. This was exceedingly creditable, first of all to Mr. Cooper, who was the mainspring of the organization, and, secondly, to the Committee, who did such useful work in supporting his efforts. Extreme regret was felt at the death of their esteemed colleague, Mr. George Andrews, the Deputy-Chairman of the Swansea Gas Light Company, who in 1909 was appointed a member of the Committee in succession to his father, the late Mr. Thornton Andrews, who was one of the founders of the Association. The untimely death of Mr. George Andrews was a blow to all of them.

GAS-MAINS AND RAILWAY REQUIREMENTS.

He had now dealt with the salient parts of the report; but there was one other matter coming before the Committee later on that day which he might take an opportunity of mentioning now, because it was another example of the good work the Association did. A letter had been received from a company who asked the help and advice of the Association in the matter of running their pipes under railway lines. It appeared that there was a requirement of the railway company that if a pipe be placed under their permanent way it should be surrounded with a 9-in. band of concrete, which must extend 6 ft. on either side of the rails. He thought this was a most outrageous proposal, and whatever it was wanted for he could not imagine. It would make it an exceedingly difficult matter to get at the joints; and there was no doubt whatever that any pipe, whether it was wrought iron, cast iron, or steel, in use for the transmission of gas, could with perfect safety be left under a single or double line of rails until the time arrived when it might require to be removed for the purpose of enlarging the supply. However, this was one of the kind of things they were from time to time up against, and it showed how the Association were able to be of help. One of the duties they had to perform was to give the best advice possible to those who desired it under conditions such as this.

COMMITTEE MEMBERSHIP.

The final paragraph of the report stated that certain members of the Committee retired, "all of whom offered themselves for re-election." In the letter this might be true, but in the spirit it was not. Mr. Harry Jones did not really offer himself for re-election, though he was down there as having done so, and no doubt the Secretary was, legally speaking, satisfied that he had. Mr. Jones's own feelings were that he had been connected with the Association for a long while, and was no longer able to give the necessary time to the work, and for these reasons he had a great deal of doubt as to the desirability of his continuing on the Committee. He (the Chairman) assured him that this was a mistaken notion. If he could come and discuss with them any matter of special importance, they would be perfectly satisfied, and hoped he would to this extent allow them to leave his name on the Committee.

GAS REGULATION ACT SPECIAL ORDERS.

The VICE-CHAIRMAN (Mr. R. W. Edwards, of Aldershot), in seconding the adoption of the report and accounts, remarked that they would all agree upon the excellent manner in which the Chairman had covered the ground. One matter to which he would like to refer (and which had already been discussed) was in regard to the important provision contained in section 10 of the Gas Regulation Act. Most of them knew what the intention of this was. It was to facilitate the obtaining by gas undertakings of statutory powers—more especially in connection with amalgamations, absorptions, purchases, &c. What, however, they found from experience was that there was a likelihood of this facility, which was intended to be economical, becoming an expensive one—quite as expensive as a Private Bill. At the moment, he did not think either the National Gas Council (who had also discussed the matter) or their Association could suggest a way out of it. It was more or less for individual companies to weigh up their conditions, and determine whether, in asking for powers, it would not be better, if they were likely to meet with extensive opposition, for them to go at once for a Bill, rather than expose themselves to an additional attack, as they did under section 10. They had to go before the Board of Trade, and were then subsequently faced with the possibility of just the same opposition as if it were a Bill. He remembered some years ago his promoting a Provisional Order, which was intended largely for capital purposes, and they put in one or two other little things. The opposition, however, was extremely keen. They were faced first with an expensive inquiry before the Board of Trade, next with opposition in the House of Lords, and finally their opponents tried to throw it out on the third reading in the Commons. Even under the Provisional Order system, they were liable to this expense. It was a pity that one was exposed to this, but it could not be avoided under section 10. When the Gas Regulation Act was being talked about, a little anxiety was felt on this point, but they had to be satisfied. With the Orders under section 1, they were doing very well in getting them without having to lay them on the Table of the House. Personally, he thought that, where a company operated in a number of districts, it was as well, in the event of opposition being threatened, to go for a Bill. There had just been held the first inquiry in connection with the revision of standard prices; and those of them who were present would have appreciated two or three things. One point which struck him was that the Board of Trade did all they could to simplify matters, and make things easy for both sides. One point which he thought was admitted by the County Council was that a gas company, in the matter of a revision of the standard price, were entitled to claim—and they must prove, of course—any advantage which they had claimed within the control of the Directors. In other words, what they had got to shed was the advantage arising from circumstances beyond the control of the Directors. If they could prove that certain things had been carried out by which the undertaking had benefited, then, he took it, the undertaking would be entitled to this allowance. There was another point as to whether the calculation of this should be taken from 1914 or from the date of the new standard under the Gas Regulation Act. It would be most interesting to have these matters settled, as no doubt they would be when the Gas Light and Coke Company got their new standard. Certain remarks of the Chairman did make one feel that the gas industry had not made the best of its commodity. Vast improvements had of late years been made in the utilization of gas so as to avoid waste; but the question was whether they were making this fact public enough. He hoped that at Wembley the industry would make the very best of their opportunity.

PROCEDURE UNDER SECTION 10.

Mr. R. BRUCE ANDERSON also referred to section 10 of the Gas Regulation Act; remarking that he had looked very fully into the matter of the expense of promoting Special Orders. The feeling he had was that they might be justified in questioning the authority under which these conditions for two inquiries had been laid down. If reference were made to the Gas and Water Works Facilities Act, it would be found that the *modus operandi*, in regard to reference to a Committee, was fully set out; but there was not a word of this in the Gas Regulation Act. If it was necessary to put it in the 1870 Act (and it would not have been inserted otherwise), and it was absent from the Gas Regulation Act, it should be well worth while questioning whether what was now being done was right. He argued from what he had pointed out that the officials of the House were exceeding their powers in applying the terms of the 1870 Act to Special Orders under the 1920 Act.

The CHAIRMAN said this was an interesting point on which he hardly thought they could ask Mr. Cooper to advise them at the moment.

The SECRETARY pointed out that what was done was by a vote of the House, and not on the authority of the officials. The House could do what it liked. As a matter of fact, the House of Lords gave notice some time ago of a proposition that the Standing Orders should be amended to give people who petitioned against a Gas Order made under section 10 the right of petitioning, just as they could under a Private Bill. This had not yet been considered by the House, but it was the idea of the House. The officials could not take such a matter upon themselves. One could not dictate to either House what they should or should not do.

Mr. A. A. JOHNSTON (Brentford) said the time factor should be borne in mind. In going for an Act certain procedure had to be adopted which might delay matters for two years, whereas a Board of Trade Order could be got through in a very much shorter time.

The CHAIRMAN remarked that this was very important. The matter was one that must be settled according to circumstances.

The report and accounts were then unanimously adopted.

RE-ELECTIONS.

On the proposition of the CHAIRMAN, seconded by the VICE-CHAIRMAN, Sir J. Fortescue Flannery, Bart., was re-elected President, and Mr. H. E. Jones, Mr. Charles Hunt, and Mr. Reginald G. Clarry, M.P., Vice-Presidents.

Upon a proposition for the re-election of the retiring members of the Committee—Dr. Charles Carpenter, C.B.E. (Chairman), Mr. J. Ferguson Bell, Mr. Charles F. Botley, Mr. A. A. Johnston, Mr. H. E. Jones, and Mr. H. A. Stibbs—being submitted, the CHAIRMAN pointed out that he had already mentioned this matter.

Mr. J. L. GARRARD (Eastbourne) thought that rather a wrong course had been taken in regard to Mr. Jones. If anyone had earned a rest, Mr. Jones had. Why should they not elect his son, Mr. Stanley Jones, the Engineer of the Commercial Gas Company, in his place? They would still have Mr. Jones, Senior, as a Vice-President.

The CHAIRMAN said the real difficulty was that they were not sure whether Mr. Stanley Jones would be willing to serve, though no doubt Mr. Harry Jones would appreciate the honour of his son being elected to fill his place. If the proposal was left to the consideration of the Committee, they could perhaps deal with it better in twelve months' time.

Mr. W. F. WHITTAKER (Grays) seconded the motion, which was agreed to.

The Hon. Auditor (Mr. W. A. Scott) was re-appointed, on the proposition of Mr. JOHNSTON, seconded by Mr. RALPH HALKETT (Sheffield).

VOTES OF THANKS.

The CHAIRMAN proposed a vote of appreciation of the admirable work done by the Secretary during the past twelve months. He said that, the more one saw of the affairs of the Association, and what Mr. Cooper did for it, the more one was impressed with the earnestness and ability that he brought to bear upon his labours. They were obtaining the full benefit of his tremendous experience. In fact, he (the speaker) did not know of anybody who had quite so complete an experience of gas matters as Mr. Cooper possessed. This rendered his help of great value to the Association and to every member of it.

The VICE-CHAIRMAN seconded the vote, with the remark that Mr. Cooper was a most excellent Secretary, who did everything he possibly could to facilitate the work of the Association and of the Committee.

Mr. COOPER, in acknowledgment, said he always did the best he could for the Association; and it was a matter of gratification to him to think that the members appreciated it.

The VICE-CHAIRMAN proposed a vote of thanks to the Chairman. He said they were extremely fortunate in having Dr. Carpenter in this position. He carried with him tremendous weight and strength, and threw himself heart and soul into the wotk. Nothing was too small, and nothing was too big, for him to handle. So far as the past year was concerned, Dr. Carpenter had devoted himself whole-heartedly to the Therm Inquiry.

Mr. ANDERSON seconded, and expressed the conviction that the evidence given by the Chairman had had a good deal to do with the conclusions arrived at by the Therm Committee. ["Hear, hear."]

The CHAIRMAN, in acknowledgment, said the work he had to do was not of an arduous character, but they must have an Association of this kind ready to deal with problems that might from time to time crop up. One could never tell what was going to happen. They had not come out badly, as an Association, from the Therm Inquiry.

BRITISH SULPHATE OF AMMONIA FEDERATION, LTD.

Third Annual General Meeting.

The Third Annual General Meeting of the Federation was held on the 16th inst. at the Head Office, No. 30, Grosvenor Gardens, S.W.—Mr. D. MILNE WATSON (Chairman) presiding.

The report which was submitted included the following statements:

The improvement in the general position of nitrogen which we were able to record in our last report was maintained during the year under review. The great stock of nitrate of soda, which for so long was the dominating, and indeed oppressive, feature in the market, was gradually reduced to normal proportions, chiefly owing to an excellent demand from the cotton fields of the United States. At the same time, good progress was made in liquidating the heavy stocks of sugar which had caused such great financial embarrassment in Cuba and other countries, and our sugar-growing Colonies and Java could look forward with greater confidence to the future.

WORLD'S PRODUCTION AND DISTRIBUTION.

British and American production of all forms of ammonia calculated in terms of sulphate of ammonia during the three calendar years has been as follows:

—	United Kingdom.	United States.	Total.
	(Tons, 2240 lbs.—25 p.ct. NH_3.)	(Tons, 2240 lbs.—25 p.ct. NH_3.)	
1920	409,875	445,950	855,825
1921	260,850	320,090	580,940
1922	361,675	466,070	827,745

These figures show that there has been a recovery in production in both countries after the set-back in 1921. In all three years there has certainly been a small increase in production in the smaller countries which are consumers as well as producers. Provisional estimates for 1923 indicate that the total reached in 1920 will be slightly exceeded.

If the German figures are included, the increase in the world's production and consumption of ammonia compounds since 1913 appears still more remarkable. The total world production in 1913 was about 1,322,000 tons, whereas at the present time the total output must be approximately at the rate of 2,040,000 tons per annum. Of this quantity, about 1,770,000 tons may be considered to be sulphate of ammonia. While no large increase in the recovery of ammonia from bye-product ovens and coal gas seems likely in the near future, a considerable addition to the world's supply may be expected from synthetic plants both in England and in other countries; and the time is therefore probably approaching when the output of ammonia compounds will be at least equal to, if not greater than, the production of nitrate of soda. The new projects include a Haber plant at Toulouse to make 180,000 tons of sulphate of ammonia per annum; and it is hoped to add 50,000 tons per annum to the supply available in Northern France by working the Claude process at coke-oven plants.

It is of interest to compare British and American exports of sulphate of ammonia for the last three calendar years.

—	Exported from		Total.
	United Kingdom.	United States.	
	Tons.	Tons.	Tons.
1920	110,016	89,566	199,582
1921	128,433	102,614	231,047
1922	144,342	147,331	291,673

In 1920 and 1921 Germany is believed to have exported about 60,000 tons per annum, apart from quantities delivered to France on reparations account.

HOME PRODUCTION AND DISTRIBUTION.

We give our usual table showing production and distribution. The figures for total production are taken from the Alkali Inspector's report, and relate to the calendar year, while the remaining figures relate to the "Fertilizer" year commencing June 1 in each year; hence the quantity stated below as exported for "1922" was exported during the year June, 1922, to May, 1923.

—	Total Production of Ammonia as Sulphate of Ammonia. (Alkali Report.)	Production of Sulphate/Ammonia as such.	Exported. (Customs Returns.)	Used for Home Agricultural Consumption.	Nitrate of Soda Used for Home Agriculture.
1913	432,630	372,000*	324,100	40,000*	80,000*
1914	426,400	363,000*	306,430	50,000*	80,000*
1915	426,300	350,000*	265,000	64,000*	40,000*
1916	433,700	315,500	188,860	144,600	5,000*
1917	458,600	283,500	32,220	234,000	5,000*
1918	432,600	331,500	38,450	269,000	10,000*
1919	397,500	361,360	116,570	233,500	40,000*
1920	409,875†	315,630	135,130	166,929	40,000*
1921	260,850†	229,390	117,690	136,000	55,000*
1922	361,675†	340,000	187,600	140,200	57,000*

* Estimated. The nitrate of soda figures are only rough estimates.
† Basis 25 p.ct. ammonia.

There has been a steady recovery in output during the year, chiefly at coke-oven plants; but, as we predicted in our report for 1921, it has taken two full years from the date of the great coal stoppage in 1921 to restore British production to the level reached in 1920. The total production of sulphate of ammonia, as such, for the year ending May, 1923, may be estimated at about 340,000 tons. The total quantity used in Great Britain and Ireland for all purposes may be taken as 142,000 tons, and the Customs returns show that 187,600 tons were exported.

HOME AGRICULTURAL CONSUMPTION.

The year under review is generally regarded as having been a disastrous one for farmers. The prices of wheat and potatoes are said to have fallen below the cost of production, and as a result there has been a further shrinkage in the total arable acreage. The Norfolk farm labourers' strike also adversely affected farming operations in that important arable district. It is therefore with great pleasure that we are able to report an increase of about 4000 tons in the total quantity of sulphate of ammonia delivered for home use. The fact that this increase has taken place *pari passu* with an estimated increase in the home consumption of nitrate of soda and with an importation of about 10,000 tons of Norwegian nitrate of lime, seems to indicate increasing recognition by British farmers that larger quantities of so-called "artificial" nitrogen can be employed with profit. This increase may, however, be due in part to a diminution in the supply of farmyard manure.

While the consumption of nitrate of soda in Great Britain is still considerably below the figure reached in 1913, the quantity of sulphate of ammonia used at home exceeds by 100,000 tons the average pre-war total.

EXPORTS.

The net increase in exports for the year amounts to no less than 70,000 tons. Out of this total, Spain, Portugal, and the Canary Islands account for 53,000 tons, Egypt for 1300 tons, Java for 5000 tons, Japan for 9500 tons, and China for 5700 tons. All these countries, except Portugal and China, have been the object of special efforts in educational and commercial organization on our part; and we feel confident that the increase will be maintained, and even exceeded, next year. At the same time, special attention will be given to Portugal and China.

While price, propaganda, and organization have each played an important part in this recapture of foreign trade from our overseas competitors, the supreme factor has undoubtedly been the great improvement in quality, and the large percentage of acid-free or neutral sulphate of ammonia which has been exported. Great Britain has now set up a standard of quality which but few of her competitors attain, and none surpasses. The great measure of attention which is being devoted by our chemists and engineers to the attainment of an even better mechanical condition, shows that we are determined to maintain the lead we have secured. It is, we think, not unfit that we should remind members that this improvement in quality has been brought about after eight years of strenuous effort on the part of the Federation and its predecessors. The chief reason for the success of the effort has been the Federation's ability to pay the individual member in accordance with the quality he delivers; and nothing but central organization could have conferred this ability to pay. The keen rivalry between individual members to surpass their fellows in quality, disposes of the fear that centralization necessarily implies stagnation.

The production of neutral quality is now about 70 p.ct. of the total output.

The SECRETARY, having read the notice convening the meeting and the report of the auditors,

The CHAIRMAN said: In spite of the political troubles on the Continent, the average price for last year was about 10 p ct. higher than for the preceding year. Although it must be remembered that this rise followed on a fall of no less than 41 p.ct. from the level reached in 1920-21, yet the better price obtained for last year undoubtedly helped to stimulate the general revival in the coke-oven industry, and probably prevented many small gas undertakings from throwing their ammoniacal liquor to waste, instead of making it into sulphate.

HIGH COST OF SULPHURIC ACID.

Nevertheless, we are still suffering from high costs of production, and, in particular, from the high price of sulphuric acid. Before the war, sulphuric acid could be bought at 25s. per ton; the very lowest price at which acid is now being sold, as far as I am aware, is 55s. per ton—120 p.ct. more than the pre-war figure. Most of you, however, are still paying 60s. per ton—140 p.ct. more—and many large consumers are still being asked 80s. in some districts. An examination of the cost of materials and labour required to make acid would not appear to justify a selling price so much greater than the pre-war price. I feel bound to add, however, that the National Sulphuric Acid Association have made us a very fair offer to go into this question of costs with them. I know that the results of inquiries into the cost of production of acid have shown that, on certain assumptions, a case can be made out for the present prices. But I would say this to the National Sulphuric Acid Association, and to those who are responsible for its present policy—and I believe it is a fair question to put, even before we examine their costing figures: "Are you convinced that your assumptions are sound and really defensible? You have not convinced us that they are. A policy of high prices is bound to stimulate the search for alternatives, and at the same time to call into being new production. Our attitude towards alternatives and new production is going to be determined by the measure of the assistance which you are willing to give us, to help us in meeting the competition which we see looming up against us in the nitrogen market."

INCREASED PRODUCTION AND DEMAND.

That brings me to the question of supply and demand. Our production last year was about 50 p.ct. larger than for 1921-22. Our total exports show a gain of 58 p.ct., and home deliveries an increase of 3 p.ct. on the previous year.

This expansion in trade is, I think, very satisfactory; and as we know that there has also been an increase in the quantity used in America, we can say with confidence that the demand for sulphate of ammonia is steadily increasing year by year. And here I would like to take a look back for a moment. The sulphate of ammonia problem is apt to look a small one, compared with nitrate of soda. That is because all, or nearly all, the nitrate is made in one country. The total quantity of sulphate of ammonia available for export from countries in which

the whole production is not consumed is under 450,000 tons at present, whereas exports of nitrate of soda from Chile are of the order of 2,300,000 tons per annum. This statement of the position altogether obscures the fact that the total production of ammonia salts in the world is now well over 2,000,000 tons, three-quarters of which are consumed "at home," only the balance being available "for export." It also leaves out of account the fact that during the last decade there has been an increase of no less than 53 p.ct. in the world's consumption of sulphate of ammonia, and this notwithstanding a considerable expansion in the production of cyanamide and other newer forms of nitrogen.

Now it must be remembered that this largely increased quantity of sulphate of ammonia which is being made is all being consumed at a time when a large portion of the inhabitants of the world are living a standard of life probably as low as the terribly low standard which resulted from the Thirty Years' War. That picture gives you the political complement of the statistical summary which we gave in our last annual report but one, showing that a large expansion in the demand for nitrogen may be expected if conditions become normal again.

Improvement in Quality.

I have just alluded to our contribution towards last year's increase in consumption. The increase in exports of 58 p.ct. following after a year in which we had experienced very severe competition from America is, I believe, very largely—I might almost say entirely—due to the remarkable improvement in the quality of our output. About 70 p.ct. of our production is now of acid-free or neutral quality, and can therefore be sent to the most distant parts of the world without fear that there will be loss in weight on arrival due to rotting of bags. What is possibly of more importance is that it will arrive in a condition ready to put on to the land. We have been able to trace an immediate result of the adoption of this high standard of quality in markets like Japan, which in the last two years seemed to have been altogether lost to us. The full effect of this recapture of markets will be made apparent in next year's export figures; and we are making no empty or boastful claim in the report, in stating that we have set a standard of quality which is attained by few, and surpassed by none of our competitors.

Successful Propaganda Work.

The fact that we have been able to increase our home sales in a year which is generally admitted to have been disastrous for farmers, is a tribute to our propaganda work, although here, again, quality has undoubtedly played a great part in helping us to maintain our position. The chief factor in successful propaganda work is the personal touch; and I would like to say on behalf of my colleagues that those of us who have been able to take a personal interest in our methods of propaganda have been pleased to recognize in our propaganda staff in England, Scotland, Wales, and Ireland an enthusiastic band of workers, who have succeeded in gaining the confidence of a large and increasing number of farmers. You will see from the report that we have made an arrangement to do joint propaganda with Buxton lime firms, and that the price of lime has been reduced. All agricultural authorities are agreed that British farmers use far too little lime. Competitors of ours have tried to take advantage of this well-known fact to endeavour to foist upon farmers nitrogenous fertilizers containing a small percentage of lime, at a price far in excess of their value when compared with the price of nitrogen in sulphate of ammonia. Our advice to farmers is to disregard these offers, and to stick to the real article—lime. We have reduced our home prices for sulphate of ammonia by £2 10s. 6d. per ton—about 15 p.ct.—since last spring. Our present price is well below the pre-war price. It will pay farmers to invest that saving in a purchase of lime.

While we are thus, I think, devoting adequate attention to the home market, which, I would remind you, is still our largest individual market, and absorbed last year no less than 41 p.ct. of the total British production, we are by no means neglecting foreign countries.

Foreign Trade Development.

Our propaganda offices in Spain, Canary Islands, Portugal, Egypt, and Italy are doing educative work framed to suit the conditions obtaining in those countries. We have made special arrangements in Japan and Java, in order to develop consumption in those important consuming countries; we are co-operating with the propaganda organization in France; and we have in view large schemes of expansion in the Far East, about which I hope to be able to say more at our next meeting. We are, I think, rapidly reaching a stage when we shall be able to say proudly, *Quae regio in terris non nostri plena laboris.*

Reduced Administration Charges.

But let me assure you that, although the volume and scope of our operations increase year by year, we are keeping a strict watch over our expenses. I was amused, as well as annoyed, the other day, to hear that one of our critics had remarked: "Ah, yes! The Sulphate of Ammonia Federation has expansion on the brain, and, as a result, their cost of administration is now about 55s. per ton!" That, gentlemen, is a statisticological inexactitude. Our cost of administration last year was, not 55s., but 1s. 4d. per ton—a reduction of 6d. per ton on the previous year. We hope the figure will be further reduced this year. Our cost of propaganda last year was 1s. 5d. per ton; and we are going to ask you to vote a sum equal to about 1s. 7d. per ton for this year. That makes a total of about 2s. 9d. per ton for administration and propaganda. I think there can be but few individual firms or associations who do as much as we do at such small cost. The report shows that we do not neglect the smaller economies. We have during the year recovered over £3000 from railway companies for overcharges.

An Appeal to Non-Members.

Well, gentlemen, notwithstanding the manifest advantages which our organization has to offer, I regret to say there are still just a few makers in England—whose aggregate production does not amount to 10 p.ct. of the total output in Great Britain—who have not yet been able to make up their minds to join us. One of them has paid us the compliment of setting up a propaganda organization very similar to our own. We honour them for it, but we think we do the work cheaper. As regards these outside firms, we feel that it would be only fair that they should share the small expenses of working the Federation, especially propaganda expenses. Moreover, the Federation gives an advantage in price to the home market, and we again think it would be only fair that this subsidy should be borne by all makers. Refusal to share in this expenditure for the increase of consumption is the meanly wise and greatly foolish policy which has given the Americans and Germans a lasting supremacy over us in certain trades.

I say to British manufacturers: If there is an efficient association or Federation in your trade, join it; if there isn't, create it.

Canadian Producers Join Federation.

I was able at our last meeting to announce a notable accession to our strength in the membership of Synthetic Ammonia and Nitrates, Ltd. I am sure we all congratulate them most heartily on having reached the producing stage, and we are glad to welcome Colonel Pollitt as a member of our Council. I have another piece of good (and, I think, very significant) news for you to-day. That is, that Canadian producers of sulphate of ammonia representing a large proportion of the total output in that country have decided to throw in their lot with us, and have joined the Federation. I must say that I am pleased and proud to be able to announce this signal mark of appreciation of our aims and methods which we have received from makers whose production forms no small part of the total productive activity in the greatest of our Sister Nations, and who are separated from us by over 3000 miles. That, I think, is a very practical link in the Empire; I feel sure it will be a lasting one.

In conclusion, I would like to say that it is of vital importance to us, as nitrogen producers, that peace should be restored in the world as soon as possible; and I am sure we would support the Government in any steps they take to attain that end, while at the same time providing for national security.

On the motion of the Chairman, seconded by Mr. E. J. George (Vice-Chairman), the report and accounts were adopted *nem. con.*

The Auditors (Messrs. Thomson McLintock and Co.) having been re-appointed, the Chairman, moved, and Mr. A. Stanley (Simon-Carvés, Ltd.) seconded a resolution to continue propaganda work.

On the motion of Mr. A. Read (Bolckow, Vaughan & Co., Ltd.), seconded by Mr. Stanley, the meeting then re-elected Mr. D. Milne Watson (Gas Light and Coke Company) Chairman, and Mr. E. J. George (Consett Iron Company, Ltd.) and Mr. A. K. M'Cosh (William Baird & Co., Ltd.) Vice-Chairmen for the ensuing year.

Cordial thanks were voted to the staff, on the motion of the Chairman.

The General Manager (Mr. F. C. O. Speyer) briefly returned thanks, and the proceedings terminated with a hearty vote of thanks to the Chairman.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Marple Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. 9d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 4½d. per therm.

Portland Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 9d. per therm.

It is also proposed that the following additional charges should be made for prepayment meter supplies: 1½d. per therm where no free fittings are supplied beyond the meter; 2d. per therm where a cooker is supplied free; and 3d. per therm where a cooker and other fittings are supplied free.

SPECIAL ORDER.

South Bank and Normanby Gas Light and Coke Company, Ltd.

Notice is given by the Company of their intention to apply for a Special Order under section 10 to enable them to raise additional capital, to confirm the purchase, and authorize the use for gas-works purposes, of scheduled lands, to re-define the limits of supply, and for other purposes.

Yorktown and Blackwater Capital Issue.—The £20,000 of 5 p.ct. preference stock of the Yorktown and Blackwater Gas and Electric Lighting Company (tenders for which were recently asked for in our advertisement pages by Messrs. A. & W. Richards) was very substantially over-subscribed.

Darlington Gas Department.—The accounts for the year ended March 31 show a net profit of £5730. Of this sum, £3000 has been allocated to the relief of rates, and £2730 has been placed to the gas-works reserve account. The total expenditure was £101,941, and the income £120,692. Sales of gas amounted to £87,065; and for residuals £28,944 was obtained.

Price of Gas at Blackpool.—The Blackpool Gas Committee have recommended a reduction in the price of gas from Jan. 1 from 3s. 1½d. to 2s. 6d. per 1000 c.ft. Last April the charge was reduced from 3s. 6½d. to 11s present figure; so that, if the recommendation is carried, the price will have declined 1s. 0½d. in nine months. The pre-war charge was 2s. Last year the undertaking made a net profit of over £23,500, which was far above the estimate. On Nov. 22 it was stated to the Committee that the Department made a profit of £16,220 during the first six months of the year. During the five weeks ended Nov. 21 the output of gas was 84,430,000 c.ft., compared with 77,650,000 c.ft. for the corresponding period of 1922.

SCIENCE AND PROGRESS.

In connection with the annual meeting, on Tuesday evening of last week, of the Circle of Scientific, Technical, and Trade Journalists, which was held in the Hall of the Institute of Journalists, Tudor Street, E.C., and was preceded by a cosy little dinner, a thoughtful and well-reasoned address on "Science and Progress" was delivered by Sir Richard A. Gregory, who is Chairman of the Circle.

First of all, however, there was a little formal business to be transacted. The report for 1922-23, which was submitted by Mr. Leon Gaster (as Hon. Secretary), contained a record of useful work, and gave the members the gratifying assurance that further papers and visits are in prospect. Those eligible for membership (which is open to anyone associated with scientific, technical, and trade journalism) may usefully have their attention drawn to the statement in the report that "the Circle has been able to fulfil its purpose of affording opportunities to journalists to discuss subjects of scientific and industrial interest." The Chairmanship remains with Sir Richard Gregory, who has with him as Vice-Chairman Mr. Meyjes; while Mr. Gaster has the help of two Assistant Hon. Secretaries—Mr. Percy L. Marks to deal with papers and discussions, and Mr. P. N. Hasluck to arrange for visits and social events.

In the course of his address, Sir Richard Gregory argued that it is futile to rail against the progress of science, or to attempt to prevent it. Knowledge will grow more and more, whatever the attitude of the public may be towards it. During the last fifty years there have been more scientific discoveries and applications than in the whole history of the human race; and we are on the threshold of developments by which forces will be unloaded and powers acquired beyond what have hitherto been known to mankind. Whether these shall be used to promote individual benefit and social comfort, is not a question for science to decide, but for the public and its leaders. We have to make ourselves worthy to use the treasures which scientific explorers are continually bringing back from unknown regions, so that they may be a blessing, instead of a curse, to mankind. Science is no more responsible for such horrors as those of the late war than it is for the soul-destroying social conditions introduced by the revolution based upon its applications.

Must you, asked the lecturer in the course of some examples, regret the discovery of nitre or saltpetre because it is an essential constituent of many explosives, and forget that it is an agricultural fertilizer which has greatly increased the abundance of crops of many kinds? It is largely through the use of such fertilizers that the average yield of wheat per acre in England is now about 30 bushels, instead of the 20 bushels of the seventeenth century. The land surface of England available for growing our food cannot be increased with the growth of population, which is nearly four times what it was a century ago; and the only way out of the difficulty is to increase the yield from it. This may be done by breeding more productive or disease-resisting varieties of wheat, and by the freer use of fertilizers.

Every scientific discovery, however remote it may seem at the moment from the practical needs of life, proceeded Sir Richard, may be the seed from which will grow a mighty tree, under which man will erect his industrial tent. Before things can be used in any way, they must be discovered; and it is the particular function of science to reveal them. It is our duty as citizens to see that the power which scientific research is placing in the hands of man shall be used for noble and spiritual purposes.

LOUGHBOROUGH GAS UNDERTAKING.

Ministry of Health Inquiry.

The desire of the Loughborough Corporation to remove the gas-works, which are in the centre of the town, to a more convenient site, was mentioned in the course of an inquiry held in this Leicestershire borough, on Thursday, by Major J. Stewart, O.B.E., R.E., on behalf of the Ministry of Health, relative to an application made by the local authority for sanction to borrow £8225 for the purpose of new offices. The Town Clerk explained that the present buildings, which were erected in 1872, were required by the Leicestershire County Council for extensions of the Loughborough College. In 1909 the Town Council entered into an arrangement with the county authorities to transfer the site and property to them; and the County Council were now pressing them to fulfil the agreement. The borrowing of the sum involved in the application would not affect the rates.

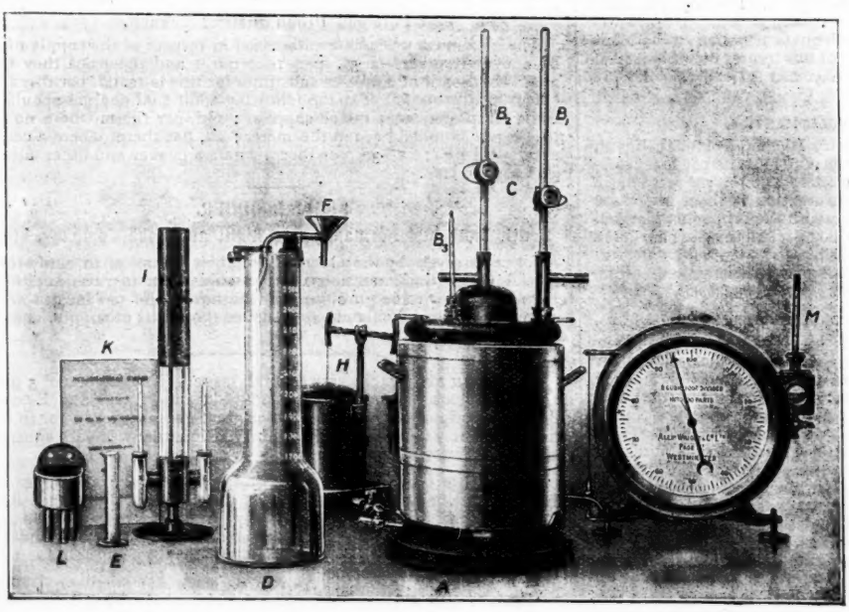
The Town Clerk explained that, in connection with the erection of the new offices, it was proposed to provide up-to-date showrooms in which to exhibit gas appliances. It was further explained by the Gas Manager that £3225 would be required for slot meters and stoves, and £1000 for extension of mains.

The question of the advisability of applying for a further £1000 for main extensions having been discussed, the Town Clerk said that this additional sum would be asked for in due course. It was explained that £3850 would be needed for the new buildings. Of the 6300 houses in the town, 5858 were being supplied with gas, and many additional consumers were expected. The Town Clerk said the desire was to remove the gas-works from the centre of the town.

Mr. R. Spriggs, a member of the Gas Committee, said that great efforts had been made to popularize the gas service locally. At present they were doing practically no gas-fire work, in regard to which there were possibilities of remunerative business. As to the removal of the works, however, he did not think that even the Committee were unanimous on the question. If a gas-plant were erected near to one of the railway stations, it would not affect the usefulness of the new offices and showrooms.

At the close of the inquiry the Inspector visited both sites.

BOYS CALORIMETER



GAS REGULATION ACT, 1920.

CALORIMETER

as prescribed

by

GAS REFEREES.

ALEXANDER WRIGHT & Co., Ltd.,

1, WESTMINSTER PALACE GARDENS,

WESTMINSTER, S.W. 1.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The past week has seen a strong and cheerful market, with a tendency to harden all round, and actual increases in quotations for some sorts. The settlement of the boiler makers' long-standing trouble gave rise to hopes of an increased demand for inland industrial consumption. Collieries are well booked up, mainly for export, to the end of the year, and into the early months of next, so that any shipyard requirements are bound to reflect on the position. Large shipments have been arranged for Germany—for the State Railways, it is said—presumably under the credit arrangements which have been discussed recently. These run into January, and further orders are said to be pending, subject to financial arrangements being completed. The cold weather has, of course, stimulated the house-coal demand, and altogether Newcastle 'Change was in optimistic mood.

The Durham unscreened market was strong under the lead of coking coal. Best makes advanced the quotation to 25s. 6d. for prompt, with hopes of selling at 24s. 6d. over the whole of next year. The demand for gas makes was still slow; but sellers maintained their prices at recent levels, convinced that their turn will come. Specials and best qualities (Holmside, Boldon, New Pelton class) are about 24s. f.o.b., and others 22s. 6d. to 23s. 6d. While contractors are taking out their full quantities, there is very little new forward business moving.

Tonnage has been in good supply, and collieries have had no difficulty in disposing of all available coal.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

There is an appreciable increase in the demand for household fuels in Yorkshire and Lancashire; the better qualities being in more urgent request than the secondary descriptions. The shipping outlook is rather different from what it was some weeks ago, possibly owing to the differences of opinion now prevailing between Britain and the Allies. Germany is reported to be buying extensively; while France and Belgium, owing to the rates of exchange, are not in that position. The Ruhr situation, it is felt, is one that needs immediate attention in respect of the coal trade.

Gas industries are fully contracted. There appears to be a great shortage of wagons in the country, possibly due to the fact that collieries have consignments hung up which were intended for abroad. The opinion is expressed that, unless lower producing figures are reached which will enable collieries to dispose of the surplus, there will be some coal on the market in a few weeks.

The industrial position is improving in some directions; and one good feature is the iron and steel trade, which is almost the forerunner of demand for coal. The textile trades are low, and the demands in consequence are on the uncertain side. Possibly the situation may be due to the fact that Dec. 31 is usually the balancing period, business as a result being retarded.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

There is little movement in the gas coal trade of this area. Deliveries are steady; but the consumption is not increasing as fast as had been anticipated. The activity of the demand for best house coal helps to maintain the market equilibrium, values being fairly regular round about the contract prices. With very few exceptions, the gas undertakings have covered themselves till midsummer. In isolated cases, where purchases may have to be negotiated at the end of the year, little deviation from the contract prices now applying is anticipated. The most active feature of the market is connected with gas coke. In that department, the tension which has developed is of unusual severity. There is marked disparity of prices. Quick deliveries are so difficult to arrange that a stiff premium has to be paid for them. The drain upon supplies for the Baltic is an influential factor. Something like 42s. 6d. f.o.b. is obtainable, and this has caused a sharp appreciation in the home market. Furnace cokes are not in such urgent demand. Slacks and industrial fuel generally are moving off satisfactorily. Regular working of the pits ensures supply keeping pace with the demand; but there is not much chance of strengthening stocks. The transport system has been working more smoothly latterly than was the case a few weeks ago.

TRADE NOTES.

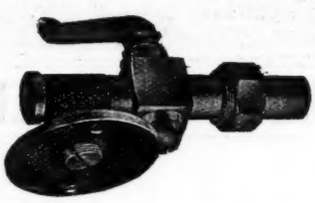
The Underfeed Stoker Company, Ltd.

An account of the recent orders received by this firm for travelling-grate stokers, suspended arches, ash conveyors, air heaters, &c., indicates the large measure of success met with by their productions.

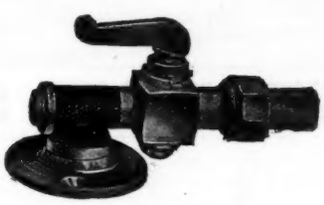
The "Thermax" Boiler.

Messrs. Ruston and Hornsby, Ltd., of Lincoln, have placed upon the market a new vertical cross-tube boiler. In this the valuable features of the ordinary vertical cross-tube boiler—viz., large direct firebox heating surface, large firebox volume, and reliability—have been retained; and, in addition, the makers claim to have improved the economy by using, in place of the large cross-tubes, tiers of smaller tubes, giving increased heating surface where most effective. The boiler is constructed in standard sizes ranging from 2 ft. 9 in. diameter by 6 ft. 9 in. high to 5 ft. 6 in. diameter by 14 ft. high.

TWO-WAY GAS FIRE TAP



USED AS STRAIGHT-WAY TAP



USED AS ELBOW TAP

The alteration is made by changing the position of screwed plug.

SAWER AND PURVES

NELSON METER WORKS, **MANCHESTER.**

WIRES { "SAWER MANCHESTER." "SAWER NOTTINGHAM."

RADFORD METER WORKS, **NOTTINGHAM.**

TELEPHONE NOS. { 3289 (City) MANCHESTER. 2025 (Central) NOTTINGHAM.

45/47, WESTMINSTER BRIDGE ROAD, **LONDON, S.E. 1.**

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 26.

In the London tar products market pitch is quiet, and in the absence of demand the price is more or less nominal. Creosote is firm at about 9¾d. per gallon net and naked. Solvent naphtha is quiet at about 1s. 5d. to 1s. 6d. per gallon for 95-160 quality. Pure toluole is 1s. 9d. per gallon, and pure benzole about 1s. 7d. per gallon. Other products are without change.

Tar Products in the Provinces.

Nov. 26.

Business in tar products has been exceedingly quiet during the past week. Pitch is decidedly easier; and while there are no definite reports of business having been done at materially lower figures, yet undoubtedly sellers would accept a lower range of prices altogether if business were possible. Buyers are still holding off, and it is doubtful whether any considerable quantity remains to be covered in for this year. Creosote is very firm indeed, and the market has distinctly improved during the past week. Naphthalene is quiet, and there are inquiries at prices which leave the market practically no advantage over the ruling prices of creosote. Carbolic is quiet, and the market is easier. There is great competition from the Continent for crystals. Cresylic acid is quiet, and sales are not easy to negotiate. White products remain a dull market, and sales are difficult.

The average values for gas-works products during last week were: Gas-works coal tar, 74s. 6d. to 79s. 6d. Pitch, East Coast, 125s. to 127s. 6d. f.o.b. West Coast—Manchester, 115s. to 120s.; Liverpool, 116s. to 121s.; Clyde, 117s. to 122s. Benzole 90 p.ct., North, 1s. 0½d. to 1s. 1d.; crude 65 p.ct. at 120° C., 9½d. to 10d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 5d. to 1s. 7d. Toluole, naked, North, 1s. 5d. to 1s. 7d., nominal. Coal tar crude naphtha in bulk, North, 8d. to 8¼d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 4d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8½d. to 8½d.; salty, 8d. to 8⅛d.; Scotland, 7d. to 7½d. Heavy oils, in bulk, North, 8¼d. to 9d. Carbolic acid, 60 p.ct., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Manchester District Tar Prices.

Our correspondent for tar prices from the Manchester district writes: The average price realized for the sale of tar, according to the sliding-scale, for the month of October, was £5 9s. 2·54d.

Sulphate of Ammonia Prices.

In a circular dated the 19th inst., the British Sulphate of Ammonia Federation, Ltd., offer to sell sulphate of ammonia for home agricultural use at the following prices:

December, 1923.	January, 1924.	February, 1924.	March-May, 1924.
£14 16	£15 2	£15 3	£15 5

per ton for neutral quality in fine friable condition, free from lumps, basis 25⅝ p.ct. ammonia, delivered to consumer's nearest station or wharf in Great Britain for prompt cash payment, in lots of 4 tons and upwards.

Limited quantities of ordinary quality will be available, especially for prompt and December, in some districts, and will be sold at 23s. per ton less than the above prices, basis 25½ p.ct. ammonia.

The Federation say it is probable that very little ordinary quality will be available from January-February onwards, as nearly all the large makers now producing ordinary quality should have converted their plants to the manufacture of neutral by that time. Buyers desiring to purchase ordinary quality should therefore be prepared to take delivery during December.

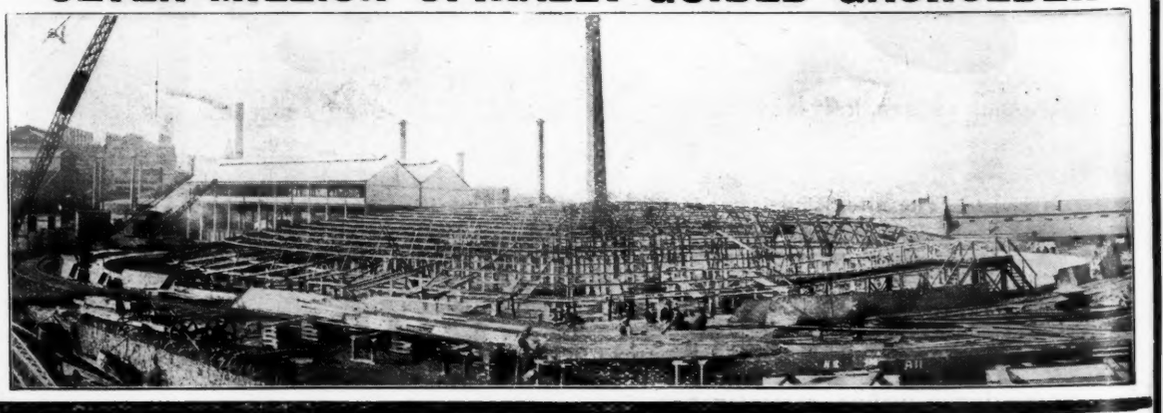
Righton and Sons, Ltd., have been registered as a Company, with a capital of £4000, to carry on business as metal workers and manufacturers of geysers, gas stoves and rings, &c. The address is No. 376, Euston Road, London, N.W.

Newark Gas Company.—At a sale conducted on Friday by Messrs. Edward Bailey & Sons, 47 £10 new ordinary shares in the Newark Gas Company were sold at par, 12 £10 class "B" shares were sold for £11 10s. per share, and 10 £10 redeemable preference shares were sold at par.

Sheffield Gas Co-Partnership.—The co partnership scheme authorized by the Sheffield Gas Company's Act of 1922 has now been definitely launched, Colonel Stephenson, the Chairman, and Mr. Ralph Halkett, General Manager, of the Company, having brought the particulars before mass meetings of the gas workers at the Grimesthorpe and Neepsend Works, and also the distribution and administrative staffs.

Knightsbridge Light Failure.—The supply of electric current to the district served by the Kensington and Knightsbridge Electric Lighting Company was cut off last Friday night for about an hour and a half. This was the second evening in succession that the supply had failed in this area. The light began to fail shortly before 8 o'clock, and by 8.15 had totally disappeared. The restoration of the current began about 9.30 and was equally gradual. The Hyde Park Hotel was lighted by hundreds of candles, and candles were necessary in numerous private houses in Ennismore Gardens, Cromwell Road, and the Queen's Gate area.

SEVEN-MILLION SPIRALLY-GUIDED GASHOLDER



R. & J. DEMPSTER, LTD., MANCHESTER.

LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W. 1.

STOCK MARKET REPORT.

THE Stock Market opened on Monday in a dull and featureless manner; but a sharp recovery in the value of the pound sterling in New York after dropping to $4.25⅜c.—the lowest point since January, 1922—brought about a complete change in the outlook. The improvement was attributed to the report that the Ambassadors' Conference had reached an agreement with regard to the resumption of military control in Germany, although in some quarters it was suggested that the rate was being "supported" in some way from this side of the Atlantic. But whatever the cause, during the remainder of the week there was a steady appreciation in this exchange, which closed on Friday at $4.36½c. As a result the markets were in a very healthy state; and although business did not show any great expansion, prices improved steadily. British Government stocks were in demand; Conversion and Funding Loans and Victory Bonds all rising 1 point. Underwriting was arranged for an issue of £2,000,000 on behalf of South Australia and £1,000,000 for Tasmania, both as 5 p.ct., to be offered at £99 p.ct. One prospectus will cover both issues, which is an innovation. Reports from the Provincial exchanges indicate strength in the Industrial Group; Tobacco shares at Bristol and Textiles at Manchester being well supported.

Gas Stocks were steady. The feature of the market being the declaration of a full dividend of 7 p.ct., as compared with 4 p.ct., on the Preference stock of the Continental Union Gas Company, resulting in a rise of 13 points, to 93-98. Other changes on the London Stock Exchange were Alliance and Dublin ordinary, which fell 1, Primitiva 5 p.ct. preference $\frac{1}{16}$, and 4 p.ct. debenture (1911) 1. South Metropolitan ordinary dropped $\frac{1}{2}$.

The following transactions took place during the week: On Monday, Alliance and Dublin 68, Bournemouth 5 p.ct. 12½, 7 p.ct. "B" 12½, Commercial 4 p.ct. 95, 95½, 96, Continental Union 32½, European 8, Gas Light and Coke 93⅝, 93⅞, 94, 94¼, 3½ p.ct. maximum 65½, 66, 4 p.ct. preference 79, Lea Bridge 98, 99, Primitiva 5s., 5 p.ct. preference 25s., South Metropolitan 96¾, 97, 97⅜, Tottenham "A" 123, "B" 102, Tuscan 5 p.ct. debentures 50. Supplementary prices, Aldersbot 5 p.ct. "A" 91, 4 p.ct. debenture 76, Gt. Yarmouth 8⅛, 8¼, New 32½, 32¾. On Tuesday, Brentford "A" 103⅜, Continental Union 32, Gas Light and Coke 93⅜, 93⅞, 94, 94¼, 94½, 4 p.ct. preference 78½, Imperial Continental 144, 146 *ex* div., 3½ p.ct. debenture 77, South Metropolitan 97, 97⅛, 97½, 98, Southampton 88½ *ex* div., Tottenham "B" 102½. Supplementary prices, Aldershot 7 p.ct. Bonds 102½, Croydon 7½ p.ct. preference 105, Leatherhead 5 p.ct. 11⅜, 11½, North Middlesex 7½ p.ct. debenture 105. On Wednesday, Bombay 5⅜, Cape Town 4½ p.ct. preference 6⅝, 6¾, Gas Light and Coke 93⅜, 94¼, 94½, 3½ p.ct. maximum 65⅜, 3 p.ct. debenture 63, Imperial Continental 3½ p.ct. debenture 77½, Primitiva 5s., South Metropolitan 97, 27½, 6½ p.ct. debenture 106½. Supplementary prices, Hampton Court 5 p.ct. 109½, Malta and Mediterranean 1st 7 p.ct. preference 90s., 2nd 7½ p.ct. preference 90s., Oxford 5 p.ct. preference 89. On Thursday, Bournemouth 6 p.ct. preference 11½, 11$\frac{5}{16}$, Cape Town 7½, Commercial 3 p.ct. debenture 60, Continental Union 32, 7 p.ct. preference 100, European 8, Gas Light and Coke 94, 94¼, 94⅜, 4 p.ct. preference 79¾, Imperial Continental 144 *ex* div., South Barracas 1½d., South Metropolitan 97, 97½, 6½ p.ct. debenture 105½, South Suburban 5 p.ct. 101½, 101⅝, Tottenham "B" 102, Tuscan 5 p.ct. debenture 60. Supplementary prices, North Middlesex 7½ p.ct. debenture 105. On Friday, Alliance and Dublin 67, Gas Light and Coke 94, 94⅛, 94⅜, 3½ p.ct. maximum 65, Imperial Continental 144, 145½ *ex* div., Montevideo 51½, 52, Primitiva of Buenos Aires 4 p.ct. debentures 71, Primitiva 4 p.ct. debenture 1911 55, South Metropolitan 6½ p.ct. debenture 106½. Supplementary prices, British 6 p.ct. debentures 102½, Danish 5 p.ct. preference 6$\frac{9}{16}$, Hornsey 5 p.ct. preference 83, Pinner 10 p.ct. "A" 9¾, Shanklin 5 p.ct. 92½, 93.

Conditions were easier in Lombard Street on Friday; 2½ p.ct. being charged for the renewal of old day-to-day loans, but overnight loans were obtained at 2 p.ct. The discount market was easier. Tenders for Treasury Bills were accepted at an average rate of £3 5s. 7·39d. p.ct.

At the close of the week, the foreign exchanges were steady. French francs cheapened a little, being quoted at 81·22½; Belgian francs remaining at 94·25, and Italian lire at 101.

Both India and China were buyers of silver, and the price closed at 33d. per oz. for cash.

The Bank rate is 4 p.ct., to which it was raised from 3 p ct. on July 5. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Divid. at Rate of	NAME.	Closing Prices, July 30, 1914.	Variation. Quotations, Nov. 23.	Variation. Lowest and Highest Prices of Transactions.
£			p.c.	% p.a.				
131,978	Stk.	Aug. 9	—	5	Aldershot 5 p.c. max. C.	..	72—77	...
217,992	,,	,,	4	4	Do. 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Oct. 4	4½	5½	Alliance & Dublin Ord.	59—64	67—72	67—68
374,000	,,	July 12	4	4	Do. 4 p.c. Deb.	76—79	62—67	...
280,000	5	Oct. 18	8	8	Bombay, Ltd.	5¼—6¼	5¼—5⅜	5$\frac{9}{32}$
100,000	10	Aug. 9	16	8½	Bournemouth Gas and Water { 5 p.c.	..	12½—13½	12½
383,110	10	,,	7	7	{ B 7 p.c.	15—15½	11½—12½	12½
115,000	10	,,	6	6	{ Pref. 6 p.c.	13½—14	11—12	11½—11$\frac{9}{16}$
162,025	—	June 28	—	4	{ 4 p.c. Deb.	..	77—82	...
992,045	Stk.	July 12	14	6$\frac{5}{16}$	Brentford A Consolid.	261—266	100—105	103½
734,930	,,	,,	11	6½	Do. B New	204—209	100—105	...
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	90—95	...
221,400	,,	June 14	4	4	Do. 4 p.c. Deb.	91—93	77—82	...
214,745	,,	Aug. 23	11	11½	Brighton & Hove Orig.	208—213	175—180	...
244,200	,,	,,	8	8½	Do. A Ord. Stk.	154—159	127—132	...
1,587,500	Stk.	July 26	5	5	Bristol 5 p.c. max.	..	95—96*a*	...
570,000	20	Oct. 4	12½	12	British A Ord.	44—45	122—127	...
100,000	10	June 28	—	7	Do. 7 p.c. Pref.	..	122—127	...
120,000	Stk.	,,	4	4	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
100,000	10	May 17	—	7	Cape Town & Dis., Ltd.	1¼—2¼	7—8	7½
100,000	10	Oct. 31	—	4½	Do. 4½ p.c. Pref.	4—6	6—7	6½—6½
150,000	Stk.	June 28	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	75—80	...
237,860	,,	,,	—	7½	Cardiff 7½ p.c. Deb.	..	108—113	...
157,150	,,	Aug. 9	5	5	Chester 5 p.c. Ord.	108—110	85—90*b*	...
1,513,280	,,	July 26	5/9/4	6	Commercial 4 p.c. Stk.	106—108	95—98	95—96
560,000	,,	,,	5½	6	Do. 3½ p.c. do.	103—105	95—98	...
475,000	,,	June 14	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	60—64	60
100,000	,,	14 Jan. 15	4	—	Continental Union, Ltd.	76—79	30—35	32—32½
200,000	,,	Dec. 14	7	4	Do. 7 p.c. Pref.	115—118	93—95	100
660,000		Aug. 9	—	6½	Croydon sliding scale.	..	102—105	...
284,975		,,	—	5	Do. max. div.	..	85—88	...
492,270	Stk.	,,	6	4½	Derby Con. Stk.	123—125	107—110*c*	...
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	74—76*c*	...
809,000	,,	—	—	5	East Hull 5 p.c. max.	..	..	...
1,002,180	10	July 12	10	5	European, Ltd.	17½—18	7¾—8¼	8
1,546,180	Stk.	July 26	4/17/4	5½	{ 4 p.c. Ord	98—102	93—95	93¾—94⅛
2,600,000	,,	,,	3½	3½	Gas { 3½ p.c. max.	76—79	65—68	65—66
4,062,335	,,	,,	4	4	Light { 4 p.c. Con. Pref.	96—99	78—81	78½—79¼
4,761,930	,,	June 14	3	3	and { 3 p.c. Con. Deb.	72½—74½	61½—64½	63
130,000	,,	Dec. 11	10	10	Coke { 10 p.c. Bonds	..	..	...
43,000	—	—	—	7½	{ 7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Sept. 19	5	6½	Hastings & St. L. 5 p.c.	..	93—98	...
258,740	,,	,,	3½	5½	Do. 3½ p.c.	87—89	78—83	...
70,000	10	Oct. 18	11	10	Hongkong & China, Ltd.	16½—16¾	16—17	...
86,600	Stk.	Aug. 23	9	9½	Hornsey 7 p.c.	..	144—149	...
1,076,000	,,	Nov. 15	9	5	Imperial Continental	150—160	143—148*	144—146
401,400	,,	Aug. 9	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	76—78	77—77½
235,242	,,	,,	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	95—100	98—99
2,127,240	,,	Aug. 23	10	5½	Liverpool 5 p.c. Ord.	..	90—91*b*	90
600,000	,,	Sept. 19	—	7	,, 7 p.c. Pref.	..	106—109*b*	...
165,736	,,	Aug. 23	7/5/0	9	Maidstone 5 p.c.	..	125—130	...
63,480	,,	June 28	—	—	Do. 5 p.c. Deb	..	55—60	...
75,000	5	June 14	6	7	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	4½—4¾	3¾—4	...
50,000	100	Oct. 1	4½	4½		99—101	95—98	...
341,920	Stk.	May 17	4	4	Montevideo, Ltd.	11½—12	49—54	51½—52
1,875,892	,,	July 26	4½	4½	Newcastle & Gatsh'dCon.	98½—99½	85½—86½*d*	86
250,166	,,	Aug. 9	—	4	Do. 4 p.c. Pref. Stk.	..	74½—76½*d*	...
129,705	,,	June 28	3½	3½	Do. 3½ p.c. Deb.	82—83	73—74*d*	...
35,000	10	Aug. 23	—	11	North Middlesex 10 p.c.	..	16½—17½	...
75,940	10	,,	7/14/0	7$\frac{7}{10}$	,, ,, 7 p.c.	14—15	11½—12½	...
300,000	Stk.	May 3	8	7	Oriental, Ltd.	117—122	97—102	...
138,120	Stk.	June 28	—	7½	Plym'th & Stonh'se 5 p.c.	..	108—113	...
60,000	50	Sept. 6	13	13	Portsea Island, B	128—131	100—105	...
100,000	50	,,	12	12	Do. C	118—121	97—102	...
1,430,345	5	29 Oct. 14	8	—	Primitiva Ord.	5¼—6	½—¼	5/-
2,499,800	5	30 Dec. 15	5	—	Do. 5 p.c. Pref.	4¼—5	1$\frac{7}{16}$—1$\frac{7}{16}$	25/-
341,400	100	June 1	4	4	Do. 4 p.c. Deb.	91—93	70—74	71
600,000	Stk.	July 26	4	4	Do. ,, ,, 1911	..	55—58	55
320,335	,,	June 28	4	4	Do. B. Aires 4 p.c. Deb.	85—87	56—59	...
321,670	,,	,,	4	4	Do. Riv. Pl. 4 p.c. Deb.	85—87	56—59	...
150,000	10	Oct. 4	6	6	San Paulo { 6 p.c. Pref.	10½—11	5½—6	...
125,000	50	July 2	5	5	{ 5 p.c. Deb.	47—49	38—41	...
270,000	Stk.	Aug. 23	10	5	Sheffield A	223—224	100—102*e*	...
419,968	,,	,,	10	5	Do. B	222—224	100—102*e*	101
1,047,000	,,	,,	10	5	Do. C	220—222	100—102*e*	101
133,201	Stk.	—	4	6	Shrewsbury 5 p.c.	..	..	...
90,000	10	Oct. 18	9	6	South African	10½—11½	7—9	...
1,609,895	Stk.	July 26	5/9/4	5	South Met. Ord.	111—113	96¼—98¼	96½—98
250,000	,,	July 12	—	5	Do. Red. Pref.	..	98—100	...
1,895,445	,,	,,	3	3	Do. 3 p.c. Deb.	72½—74½	61—64	...
734,000	,,	Sept. 6	—	6½	Do. 6½ p.c. Deb.	..	105—107	101½—106½
91,500	,,	Aug. 23	8½	8½	South Shields Con. Stk.	157—159	134—136*d*	...
1,087,795	,,	,,	6	6	S'th Suburb'n Ord. 5 p.c.	114—116	100—103	101½—101¾
368,837	,,	June 28	5	5	Do. 5 p.c. Deb. Stk.	116—118	97—102	...
647,740	,,	Nov. 15	5	5	S'th'mpt'n Ord. 5p.c. max	99—102	86—89*	88½
181,275	,,	June 28	4	4	Do. 4 p.c. Deb. Stk.	..	76—81	...
250,000	,,	Aug. 23	—	7	Swansea 7 p.c. Pref. Stk.	..	102—104	...
200,000	,,	June 28	—	6½	Do. 6½ p.c. Deb. Stk.	..	105—107	...
120,000	,,	July 26	—	8	Tottenham { A 5 p.c.	135—138	122—127	123
782,273	,,	,,	6	6½	District { B 3½ p.c.	115—117	100—105	102—102½
181,255	,,	June 14	4	4	{ 4 p.c. Deb.	87—89	78—82	...
258,251	Stk.	Aug. 23	5	5	Tynemouth 5 p.c. max.	108½—109	89—91*d*	...
30,000	,,	July 12	8½	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	140—145	...
235,636	,,	,,	6½	7½	Do. B 3½ p.c.	129—134	116—121	...
108,075	,,	,,	5/17/3	6$\frac{5}{16}$	Do. C,	110—115	100—105	...
140,865	,,	,,	—	6$\frac{5}{16}$	New Ordinary	..	..	...
332,000	,,	,,	6½	7½	Wimbledon 5 p.c.	117—122	110—115	...
98,000	,,	,,	6½	7½	Epsom 5 p.c.	121—126	118—123	...
88,416	,,	June 28	3	3	5 p.c Deb. Stk.	66—69	57—60	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. * Ex div.

SHARE ISSUE.

By Order of the Directors.

NEW ISSUE OF CAPITAL.

THE DUNSTABLE GAS AND WATER COMPANY.

MESSRS. A. & W. RICHARDS

Are instructed to offer for SALE, by TENDER,

650 £10

SIX PER CENT. PREFERENCE GAS SHARES (Irredeemable).

MINIMUM PRICE OF ISSUE, PAR.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Thursday, 6th December), may be obtained of Messrs. A. & W. RICHARDS, 87, WALBROOK, E.C. 4.

Low-Temperature Carbonization Finances.

The following is the text of a circular sent out by the Board to the shareholders of Low Temperature Carbonization, Ltd.:

"The Directors are pleased to be able to inform you that since they notified you that the 'Coalite' Smokeless Fuel Works at Barnsley were being enlarged to produce 3000 tons of 'Coalite' per week, they have been able to arrange for the provision of fresh capital for the further extension of the works at Barnsley, and also for the erection of similar plants in Staffordshire and in other coal-producing counties, with the object of increasing the output, in the first instance, up to 10,000 tons per week, to cope with the present almost unlimited demand for the fuel.

"In this connection you will be interested to learn that, through the Trades Facilities Committee, the Government is assisting in the finance of the above development."

In view of the developments noted above, interest attaches to the subjoined analysis of the results of the process:

Result of Carbonizing 8280 *Tons of Coal on a Continuous Run of* 128 *Days.*

Coal carbonized	8,280 tons
"Coalite" produced	6,210 tons
Tar oil	172,565 gallons
Gas	38,502,000 c.ft. of 829 B.Th.U.

Average Production per Ton of Coal.

"Coalite"	15 cwt.
Tar	20·9 gallons
Gas	4,650 c.ft. of 826 B.Th.U. —about 40 therms.
Cost per ton of coal carbonized, including depreciation, &c.	5s. 4d. per ton
Capital cost per retort erected	£250

Birmingham and the British Empire Exhibition.

Birmingham's "Civic Week" at the British Empire Exhibition, at Wembley Park, 1924, has been fixed to take place at the beginning of June. The object is to demonstrate the engineering (mechanical and electrical) and other industrial resources of the city and to exhibit a wide range of her manufactured products. At a meeting of the recently appointed Committee, held on Monday under the presidency of the Lord Mayor of Birmingham, Mr. Charles Stanley, the Manager of the British Industries Fair at Castle Bromwich, was appointed to act as Organizer, in co-operation with Mr. A. W. Smith, the Secretary and Manager of the Birmingham Gas Department. An Executive Committee was appointed consisting of the following gentlemen: Representing the Corporation activities—Mr. J. H. Broadley (Secretary of the Water Department), Mr. J. Jackson (Secretary of the Salvage Department), and Mr. E. J. Jennings (Secretary of the Electricity Supply Department). Representing the Birmingham University—Prof. Burstall (Dean of Science and head of the Mechanical Engineering Department). Representing the manufacturers—Mr. Evan Davies, Mr. H. Atkinson, Mr. H. O. Worrall, Major Dibben (Federation of British Industries), and Mr. G. H. Wright (Secretary of the Birmingham Chamber of Commerce). Mr. Gilbert Vyle (Managing Director of Messrs. Avery's, Ltd.) was invited to accept the chairmanship of the Executive Committee. He is the President of the Birmingham Chamber of Commerce.

The Bradford Corporation Gas Committee have decided to advance the price of coke from 22s. 6d. to 25s. per ton, largely because of the increased cost of coal.

On a recent Saturday evening, just at the busiest time, most electrically lighted premises in York were plunged into darkness for an hour, owing to a breakdown in the main feeder from the generating station to the city centre.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS; Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	35/-	18/-	10/-
	Credit Rate:	40/-	21/-	11/6
Abroad (in the Postal Union) Payable in Advance		40/-	22/6	12/6

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON

FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE

PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

SULPHURIC ACID.

JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Burnley, are MAKERS of Special SULPHURIC ACID ("Eagle" Brand), for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

WE Specialize in Small Gas-Works and Solicit Inquiries for COMPLETE WORKS, EXTENSIONS, and RENEWALS.

Penney & Porter (Engineers), Ltd.,
LINCOLN.
Established 1855.
Telegrams: Porter, Lincoln. Telephones: 266 & 211.

TULLY GAS PLANTS, LTD.,
40, NORFOLK ST., STRAND, LONDON, W.C. 2.

SOLE Makers of Tully's Patent Gasification PLANT. Specialists in Tar Extractors, Coal Elevators and Conveyors, Hoppers, Bunkers, T.G.P. Fire Cement, Castings.
Telegraphic Address: "DAMPER, ESTRAND, LONDON." Telephone: CITY 4047-8 (Two lines).

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

CORRESPONDENCE TUITION in GAS ENGINEERING for City and Guilds Institute Exams. (Preliminary and Final). Successful Results. Low Fees.
PENNINGTONS ENGINEERING TUTORS, 254, Oxford Road, MANCHESTER.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—MINORIES 1166.

GEORGE WILSON GAS METERS, Ltd. for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at 268, Stockport Road, MANCHESTER.
Telephone: RUSHOLME 976. Telegrams: "GASMETER,"
and 46 & 47, Auckland Street, LONDON, S.E. 11.
Telephone: HOP 647. Telegrams: "GASEOUS LAMB."

J. E. C. LORD (Manchester), Ltd., Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BALE & CHURCH, LTD.
38, ST. MARY AT HILL, LONDON, E.C.3
Phone: Minories 1484.
"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.
38, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Minories 1484.
"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.

BALE & CHURCH, LTD.,
38, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Minories 1484.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR (SATURATORS), LTD., Chemical Plant Engineers, Blackhorse Street Mills, BOLTON.
Telegrams—"SATURATORS, BOLTON." Telephone 843.

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C.2.
Telegrams: "Patent, London." Phone 243 Holborn.
And 8, St. Nicholas Buildings, Newcastle-on-Tyne.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Oct. 10, p. 150.